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# Reports of
# The Princeton University Expeditions to Patagonia, 1896-1899

J. B. HATCHER, IN CHARGE

EDITED BY

WILLIAM B. SCOTT

BLAIR PROFESSOR OF GEOLOGY AND PALÆONTOLOGY, PRINCETON UNIVERSITY

## VOLUME III—ZOÖLOGY

## PART IV. CATALOGUE OF THE FRESH-WATER FISHES OF TROPICAL AND SOUTH TEMPERATE AMERICA

BY

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INDIANA UNIVERSITY

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THE UNIVERSITY
STUTTGART
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## VOLUME III, 2

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CALIFORNIA

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By CARL H. EIGENMANN
INDIANA UNIVERSITY

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ACADEMY OF NATURAL SCIENCES, PHILADELPHIA

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By A. E. ORTMANN
CARNEGIE MUSEUM, PITTSBURGH

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By J. PERCY MOORE
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## PART IV.

# CATALOGUE OF THE FRESH-WATER FISHES OF TROPICAL AND SOUTH TEMPERATE AMERICA.

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INDIANA UNIVERSITY.

IN the following list are enumerated the orders, families, genera and species of fishes inhabiting the fresh waters of the West Indies, South America, and Middle America south of a line joining the Rio Panuco on the east and the Rio Presidio near Mazatlan on the west. The list attempts to be complete to June, 1909.*

Under each genus will be found the synonyms and the type of the genus, and the total range of its species. The range will be the sum of the distributions of the species enumerated, except in cases of genera having extralimital species.

Under each species are given its synonyms and the geographical distribution.

Opposite each species, except in the case of the Characins and species dealt with in the Patagonian section of this work, will be given a reference which will connect this work with the literature on the species.

A catalogue of the fresh-water fishes of South America was published by Eigenmann and Eigenmann in the Proceedings of the United States National Museum, 1891, and a catalogue of the Middle American species in the same serial for 1892. Free use has been made of these catalogues. The task of bringing the work down to date has been greatly lessened by the following works of recent years:

Jordan & Evermann, Fishes of North and Middle America. Bull. U. S. Nat. Mus., 47, Washington, 1896–1898.

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* The entire MS. was completed to 1906. Delay in publication has enabled me to bring the catalogue down to June, 1909. In consequence of bringing the catalogue down to 1909 some discrepancies between the preceding and following lists of species will be found. An especially large number of additions are made to the Characins and the fauna of Guiana.

233858

Pellegrin, Jacques, Contribution a l'Étude anatomique et taxonomique des Poissons de la Famille des Cichlidés. Paris, 1904.

Meek, Seth E., The Fresh-water Fishes of Mexico north of the Isthmus of Tehuantepec. Field Columbian Museum Publications, No. 93, Chicago, 1904.

Regan, C. Tate, A Monograph of the Fishes of the Family Loricariidæ. Trans. Zool. Soc. Lond., XVII, Oct., 1904, various revisions published in 1905, and "Pisces" in the Biologia Centrali Americana, 1906–1908.

Eigenmann, C. H., & Ward, David P., The Gymnotidæ, Wash. Acad. Sci., VII, pp. 159–188, June, 1905.

Eigenmann, C. H., The American Characidæ, *in MS.*

These papers, exclusive of the MS. monograph on the Characidæ, are referred to under the name of the author and the page. Other papers are quoted by the author, year of publication and the page. The full titles may readily be found in the bibliography at the end of the Catalogue.

All fishes recorded from fresh water are enumerated. In tropical America many marine species enter fresh water. Some of these do not go far beyond the mouths of rivers, others ascend streams several thousand miles. Perhaps some of the marine species enumerated should have been excluded, probably others should have been added. The author will be very glad to be informed of any omissions or errors of any sort.

In order to emphasize the Pacific slope fauna the species from this area are in heavy type. To readily distinguish the Amazonian species, these are preceded by an A.

## Class I. MARSIPOBRANCHII.

### Order HYPEROARTII.

#### Family PETROMYZONIDÆ.

Lampetra Gray.

Type: *Petromyzon fluviatilis* Linnæus.
Range: Brooks of America and Europe.

1. **Lampetra spadicea** Bean, . . . . Meek, 2.
Habitat: Rio Lerma Basin.

Geotria Gray.

*Velasia* Gray.
Type: *Geotria australis* Gray.
Range: Southern South America and Australia.

1. **Geotria chilensis** (Gray).
*Macrophthalmia chilensis* Plate.
Habitat: Streams of Chili and Argentina; New Zealand.

Exomegas Gill.

Type: *Petromyzon macrostomus* Burmeister.
Range: From Buenos Aires south.

1. *Exomegas macrostomus* (Burmeister).
Habitat: La Plata River.

2. *Exomegas macrostomus gallegensis* (Smitt).
   Habitat: Rio Gallegos.

CARAGOLA Gray.

*Mordacia* Gray.
Type: *Caragola lapicida* Gray.
Range: Southern South America and Australia.

1. **Caragola mordax** (Richardson).
   *Caragola lapicida* Gray; *Petromyzon anwandteri* Philippi; *Petromyzon acutidens* Philippi.
   Habitat: Chili and Tasmania.

# Class II. PISCES.

## Subclass *SELACHII.*

## Order ASTEROSPONDYLI.

### Suborder *GALEI.*

### Family GALEIDÆ.

CARCHARHINUS Blainville.

*Eulamia, Platypodon, Isogomphodon* and *Lamiopsis* Gill.
Type: *Carcharhinus commersoni* Blainville = *Carcharias lamia* Rafinesque.
Range: All warm seas.

1. *Carcharhinus nicaraguensis* Gill & Bransford, ................J. & E., 39.
   Habitat: Lake Nicaragua and its outlet.

MUSTELUS Cuvier.

Type: *Squalus mustelus* Linnæus.
Range: Warm and temperate seas.

1. *Mustelus canis* (Mitchill), ..J. & E., 29.
   Habitat: La Plata.

## Order BATOIDEI.

### Suborder *SARCURA.*

### Family RAJIDÆ.

RAJA Linnæus.

*Dipturus* and *Platopterus* Rafinesque; *Dasybatus* Blainville; *Propterygia* Otto; *Læviraja* and *Batis* Bonaparte; *Uraptera* Müller & Henle; *Malacorhinus* Garman.
Type: *Raja batis* Linnæus.
Range: Temperate seas, a few of the species entering rivers.

1. *Raja microps* Günther, Shore Fishes, 12.
   Habitat: La Plata.
2. *Raja platana* Günther, Shore Fishes, 11.
   Habitat: La Plata.

### Family NARCOBATIDÆ.

NARCINE Henle.

*Cyclonarce* and *Gionionarce* Gill.
Type: *Torpedo brasiliensis* Ölfers.
Range: Warm seas; a single American species; enters rivers.

1. *Narcine brasiliensis* (Ölfers), J. & E., 78.

*Narcine corallina* Garman; *Narcine umbrosa* Jordan; *Torpedo bancrofti* Griffith; *Narcine nigra* Duméril; *Torpedo pictus* Gronow.

Habitat: Pensacola and Key West to Brazil, entering rivers.

## Suborder *MASTICURA*.

### Family MYLIOBATIDÆ.

#### MYLIOBATIS Duméril.

*Holorhinus* Gill.

Type: *Raja aquila* Linnæus.

Range: Warm seas.

1. *Myliobatis aquila* (Linnæus), Günther, VIII, 489

Habitat: All warm seas; La Plata.

### Family DASYATIDÆ.

#### PARATRYGON Duméril.

*Disceus* Garman.

Type: *Trygon aiereba* Cuvier.

Range that of the single species,

A1. *Paratrygon strongylopterus* (Schomburgk), .......Günther, VIII, 476.

*Trygon aiereba* Duméril; *Trygon orbicularis* Günther.

Habitat: British Guiana; Amazons.

#### POTAMOTRYGON Garman.

Type: *Pastinaca humboldtii* Roulin.

Range: Fresh waters of South America.

1. *Potamotrygon brachyurus* (Günther), Günther 1880, 8.

Habitat: La Plata.

A2. *Potamotrygon humboldtii* (Roulin).

*Trygon hystrix* Müller & Henle.

? *Trygon garrapa* Schomburgk.

Habitat: Rivers from the La Plata to the Orinoco; Paraguay, Rio Branco; Orinoco at Apuré.

3. *Potamotrygon d'orbignyi* (Castelnau), Günther, VIII, 484.

Habitat: Orinoco.

A4. *Potamotrygon reticulatus* Günther, as *hystrix* Günther, VIII, 482.

Habitat: Surinam; Santarem.

5. *Potamotrygon magdalenæ*[1] (Steindachner), ......Steindachner, 1878, 56.

Habitat: Rio Magdalena.

A6. *Potamotrygon motoro* (Müller & Henle), .......Günther, VIII, 484.

*Trygon henlei* Castelnau; *Trygon garrapa* Schomburgk; *Tæniura mülleri* and *henlei* Castelnau.

Habitat: Rio Cuyaba; Rio Branco.

A7. *Potamotrygon dumerilii* (Castelnau), Günther, VIII, 484.

Habitat: Araguay; Tocantins; Rio Crixas; Paraguay.

#### ELLIPESURUS Schomburgk.

Type: *Ellipesurus spinicauda* Schomburgk.

Range that of the single species.

A1. *Ellipesurus spinicauda* Schomburgk, Günther, VIII, 472.

Habitat: Rio Jurua; Rio Branco.

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[1] Garman considers *d'orbignyi* and *magdalenæ* synonymous with *humboldtii*.

# Subclass *DIPNOI.*

## Order DIPNEUMONA.

### Family LEPIDOSIRENIDÆ.

LEPIDOSIREN Fitzinger.

*Amphibichthys* Hogg.
Type: *Lepidosiren paradoxa* Fitzinger.
Range that of the single species.

A1. *Lepidosiren paradoxa* Fitzinger, Günther, III, 322.
*Lepidosiren assimilis* Castelnau; *Lepidosiren articulata* Ehlers.
Habitat: Amazons to Paraguay.

# Subclass *TELEOSTOMI.*

## Order RHOMBOGANOIDEA.

### Family LEPISOSTEIDÆ.

LEPISOSTEUS Lacépède.[1]

*Cylindrosteus, Atractosteus, Sarchirus* Rafinesque; *Lepidosteus* Agassiz.
Type: *Lepisosteus gavialis* Lacépède.
Range: Panama and northward to Cuba and the Atlantic slope of North America.

1. *Lepisosteus tristœchus* (Bloch & Schneider), .................. Meek, 6.
*Lepidosteus berlandi* Girard; *Atractosteus lucius* Duméril; *Lepidosteus viridis* Günther.
Habitat: Cuba and Mexico from Tampico north.

2. *Lepisosteus tropicus* (Gill), .... Meek, 7.
Habitat: Isthmus of Tehuantepec, Rio Usumacinta to Panama; Huamuchal.

# Superorder *OSTARIOPHYSI.*

## Order NEMATOGNATHI.

### Family ASPREDINIDÆ.

### Subfamily BUNOCEPHALINÆ.

BUNOCEPHALICHTHYS Bleeker.

Type: *Bunocephalus hypsiurus* Kner.
Range that of the single species.

A1. *Bunocephalichthys hypsiurus* (Kner), E. & E., 14.
Habitat: Rio Branco.

AGMUS Eigenmann MS.

Type: *Bunocephalus scabriceps* E. & E.
Range: Amazons to Guiana.

A1. *Agmus scabriceps* (Eigenmann & Eigenmann).
Habitat: Jutahy.

2. *Agmus lyriformis* Eigenmann MS.
Habitat: British Guiana.

BUNOCEPHALUS Kner.

Type: *Platystacus verrucosus* Bloch.
Range: Amazons; Paraguay; Rio Grande do Sul.

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[1] *Lepisosteus osseus*, a north temperate species, reaches Tampico just within the tropics.

1. *Bunocephalus amaurus* Eigenmann MS.
Habitat: British Guiana.

A2. *Bunocephalus verrucosus* (Bloch), E. & E., 16.
Habitat: Amazon, below the Madeira.

3. *Bunocephalus doriæ* Boulenger, Boulenger, 1902.
Habitat: Paraguay.

4. *Bunocephalus iheringii* Boulenger, Boulenger, 1891, 235.
Habitat: Rio Grande do Sul and Paraguay.

5. *Bunocephalus rugosus* Eigenmann & Kennedy, ..............1903, 498.
Habitat: Paraguay.

A6. *Bunocephalus gronovii* Bleeker, E. & E., 17.
Habitat: Mouth of Rio Negro and Demarara.

A7. *Bunocephalus bicolor* Steindachner, E. & E., 17.
Habitat: Amazon and its tributaries from Cudajas to Huallaga.

A8. *Bunocephalus melas* Cope, E. & E., 18.
Habitat: Peruvian Amazon.

A9. *Bunocephalus knerii* Steindachner, E. & E., 19.
Habitat: Amazons and tributaries from Cudajas to the Andes of Peru and Ecuador.

A10. *Bunocephalus aleuropsis* Cope, E. & E., 19.
Habitat: Pebas, Ecuador.

11. *Bunocephalus chamaizelus* Eigenmann MS.
Habitat: British Guiana.

### DYSICHTHYS Cope.

Type: *Dysichthys coracoideus* Cope.
Range: Nauta; Paraguay.

A1. *Dysichthys coracoideus* Cope, E. & E., 20.
Habitat: Nauta.

2. *Dysichthys australis* Eigenmann & Ward, E. & W., 1907, 113.
Habitat: Paraguay.

## Subfamily ASPREDININÆ.

### PLATYSTACUS Bloch.

Type: *Platystacus cotylephorus* Bloch; *Cotylephorus* Swainson.
Range: Surinam.

A1. *Platystacus cotylephorus* Bloch, E. & E., 21.
*Silurus hexadactylus* Lacépède; *Aspredo sexcirrhis* Cuvier & Valenciennes; *Aspredo spectrum* Gronow.
Habitat: Surinam and Rio Para.

2. *Platystacus nematophorus* Bleeker, E. & E., 23.
Habitat: Surinam.

### ASPREDO Bleeker.

Type: *Aspredo batrachus* (Linnæus).
Range: Guiana to the Araguay.

A1. *Aspredo aspredo* (Linnæus), E. & E., 23.
*Platystacus lævis* Bloch; *Aspredo batrachus* (Linnæus).[1]
Habitat: Guiana; Rio Para and Arary.

2. *Aspredo sicuephorus* Cuvier & Valenciennes, ..............E. & E., 24.
Habitat: French and British Guiana.

### CHAMAIGENES Eigenmann.

Type: *Aspredo filamentosus* C. & V.
Range that of the single species.

1. *Chamaigenes filamentosus* (Cuvier & Valenciennes), ..........E. & E., 24.
Habitat: Guianas.

### ASPREDINICHTHYS Bleeker.

Type: *Aspredo tibicen* Temmink.
Range that of the single species.

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[1] Vaillant has suggested that *batrachus* may be identical with *sicuephorus*, in which case the next species should go by the name of *batrachus*.

A1. *Aspredinichthys tibicen* (Temmink), E. & E., 24.
Habitat: Guiana; Curuca, Rio Muria.

## Family DIPLOMYSTIDÆ.

### DIPLOMYSTE Duméril.

Type: *Arius pappilosus* Cuvier & Valenciennes.

Range that of the single species.

1. **Diplomyste pappilosus** (Cuvier & Valenciennes), .........E. & E., 26.
*Arius carcharias, villosus, squalus, micropterus* and *synodon* Philippi.
Habitat: Chili and Rio Negro of Patagonia.

## Family SILURIDÆ.

### Subfamily ARIINÆ.[1]

### PARADIPLOMYSTES Bleeker.

Type: *Pimelodus coruscans* Lichtenstein.

Range that of the single species.

1. *Paradiplomystes coruscans* (Lichtenstein), ..............E. & E., 30.
Habitat: Brazil.

### GENIDENS Castelnau.

Type: *Genidens cuvieri* Castelnau.

Range that of the single species.

A1. *Genidens genidens* (Cuvier & Valenciennes), ............E. & E., 38.
*Genidens cuvieri* and *granulosus* Castelnau. *? Rhamdia laukidi* Bleeker.
Habitat: Rio de La Plata; Araguay.

### FELICHTHYS Swainson.

*Breviceps* Swainson; *Ailurichthys* Baird & Girard; *Mystus* Gronow.

Type: *Silurus bagre* Linnæus.

Range: Tropical seas of America. Probably several species will be found entering streams. *F. bagre* and *marinus* are found in the market at Georgetown.

1. *Felichthys filamentosus* Swainson, J. & E., 118.
*Galeichthys blochii* Cuvier & Valenciennes; *Silurus bagre* Bloch *non* Linnæus.
Habitat: Atlantic side of tropical American seas; Lake Nicaragua.

### GALEICHTHYS Cuvier & Valenciennes.[1]

Type: *Galeichthys feliceps* Cuvier & Valenciennes.

Range: Pacific and temperate seas.

1. **Galeichthys aguadulce** Meek, . Meek, 9.
Habitat: Rio Papaloapam Basin.

### NETUMA Bleeker.

Type: *Arius nasutus* Cuvier & Valenciennes.

Range: Tropical seas, entering rivers.

1. *Netuma upsulonophorus* (Eigenmann & Eigenmann), ........E. & E., 73.
Habitat: Rio Grande do Sul.
2. *Netuma barbus* (Lacépède), E. & E., 76.
*Pimelodus commersoni* Lacépède; *Bagrus barbatus* Quoy & Gaimard; *Pimelodus versicola* Castelnau.

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[1] Many species of the Ariinæ in addition to those enumerated are found at the mouths of rivers and undoubtedly enter fresh water at times.

[1] *Galeichthys guatemalensis* Günther has been reported from Rio Lara, Darien.

Habitat: La Plata and northward, entering rivers.

ARIUS Cuvier & Valenciennes.

Type: *Pimelodus arius* Buchanan.

Range: Tropical seas, entering rivers.

1. *Arius agassizi* (Eigenmann & Eigenmann), ..............E. & E., 86.
   Habitat: Rio Grande do Sul.
2. *Arius multiradiatus* Günther, E. & E., 92.
   Habitat: Rios Bayano and Cianati, Panama.

HEXANEMATICHTHYS Bleeker.

Type: *Bagrus sundaicus* Cuvier & Valenciennes.

Range: Tropical seas, a few of the species entering rivers.

1. *Hexanematichthys assimilis* (Günther), E. &. E., 81.
   Habitat: Atlantic coast of Central America; Lake Yzabel, Guatemala; Rio Magdalena.
2. *Hexanematichthys grandoculis* (Steindachner), ..........E. & E., 85.
   Habitat: Rio Doce.

SCIADEICHTHYS Bleeker.

Type: *Bagrus emphysetus* Müller & Troschel.

Range: Tropical seas, a few of the species entering rivers.

A1. *Sciadeichthys albicans* (Cuvier & Valenciennes), ..........E. & E., 59.
Habitat: Amazon and northward.

### Subfamily ICTALURINÆ.

ICTALURUS Rafinesque.[1]

Range: Isthmus of Tehuantepec northeast throughout the Atlantic slope.

1. *Ictalurus meridionalis* (Günther), Meek, 11.
   Habitat: Atlantic slope of the Isthmus of Tehuantepec.

AMEIURUS Rafinesque.

Type: *Pimelodus cupreus* Rafinesque.

Range: Lerma Basin and valley of Mexico northeast throughout the Atlantic slope of America.

(HAUSTOR Jordan & Evermann.)

(Type: *Gadus lacustris* Walbaum.)

1. *Ameiurus australis* Meek, .....Meek, 13.
   Habitat: Rio Panuco to Rio Blanco.
2. **Ameiurus dugesi** Bean, .....Meek, 15.
   *Amiurus catus* Pellegrin.
   Habitat: Lerma Basin.
3. **Ameiurus mexicanus** Meek, .Meek, 15.
   Habitat: Rio Panuco Basin.
4. *Ameiurus pricei* (Rutter), ....Meek, 16.
   Habitat: Mesquital Basin north in streams of the Sierra Madre.

ISTLARIUS Jordan & Snyder.

Type: *Istlarius balsanus* Jordan & Snyder.

Range that of its single species.

1. **Istlarius balsanus** Jordan & Snyder, Meek, 17.
   Habitat: Balsas Basin, Mexico.

### Subfamily CALLOPHYSINÆ.

CALLOPHYSUS Müller & Troschel.

Type: *Callophysus macropterus* Müller & Troschel; *Pimelotropis* Gill; *Pseudocallophysus* Bleeker.

Range that of the single species.

A1. *Callophysus macropterus* (Lichten-

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[1] *Ictalurus furcatus* and *punctatus* of the Mississippi valley reach the Rio Panuco.

stein), ..............E. & E., 95.
*Pimelodus ctenodus* Agassiz; *Pimelodus insignis* Schomburgk; *Pimelotropis lateralis* Gill.
Habitat: Amazons and northward.

## Subfamily PIMELODINÆ.

### PIMELODINA Steindachner.

Type: *Pimelodina flavipinnis* Steindachner.
Range: Lower Amazon.
A1. *Pimelodina flavipinnis* Steindachner, E. & E., 101.
Habitat: Para.
A2. *Pimelodina nasus* Eigenmann & Eigenmann, ..............E. & E., 101.
Habitat: Para.
A3. *Pimelodina gœldii* Steindachner, St. 1908b.
Habitat: Rio Purus.

### PINIRAMPUS Bleeker.

Type: *Pimelodus pirinampu* Spix.
A1. *Pinirampus pirinampu* (Spix), E. & E., 104.
*? Pimelodus barbancho* Humboldt; *Pinirampus typus* Bleeker.
Habitat: Paraguay; Rio Tocantins to Venezuela.

### MEGALONEMA Eigenmann MS.

Type: *Megalonema platycephalum* Eigenmann.
Range that of the single species.
1. *Megalonema platycephalum* Eigenmann.
Habitat: Essequibo Basin.

### LUCIOPIMELODUS Eigenmann & Eigenmann.

*Perugia* Eigenmann & Norris.
Type: *Pimelodus pati* Valenciennes.
Range: Rio de La Plata to Rio Branco.
A1. *Luciopimelodus pati* (Valenciennes), E. & E., 106
Habitat: La Plata and Rio Branco.
2. *Luciopimelodus platanus* (Günther), E. & E., 108.
Habitat: La Plata; Paraguay.
3. *Luciopimelodus agassizii* Steindachner, E. & E., 183.
Habitat: Amazons.

### ZUNGAROPSIS Steindachner.

Type: *Zungaropsis multimaculatus* St.
Range that of the single species.
A1. *Zungaropsis multimaculatus* Steindachner, ..................St. 1908a.
Habitat: Xingu.

### LOPHIOSILURUS Steindachner.

Type: *Lophiosilurus alexandri* Steindachner.
Range that of the single species.
1. *Lophiosilurus alexandri* Steindachner, E. & E., 110.
*Pseudopimelodus agassizii* Steindachner.
Habitat: Rio San Francisco.

### BATRACHOGLANIS Gill.

Type: *Pimelodus raninus* Cuvier & Valenciennes.
Range: Rio de Janeiro to the Essequibo.
1. *Batrachoglanis parahybæ* Steindachner, E. & E., 110.
*Pseudopimelodus charus* Steindachner, *non* Cuvier & Valenciennes.
Habitat: Rio Parahyba to Rio Doce.
A2. *Batrachoglanis raninus* (Cuvier & Valenciennes), ......E. & E., 111.
Habitat: Rio Janeiro to Essequibo and Peru.
3. *Batrachoglanis pulcher* (Boulenger), E. & E., 111.
Habitat: Eastern Ecuador.

### PSEUDOPIMELODUS Bleeker.

Type: *Pimelodus bufonius* Cuvier & Valenciennes.

Range: Rio de La Plata to Rio Magdalena.

A1. *Pseudopimelodus bufonius* (Cuvier & Valenciennes), ......E. & E., 112.
*Pimelodus charus* Cuvier and Valenciennes.
Habitat: Rio San Francisco to Magdalena.

2. *Pseudopimelodus cottoides* Boulenger, Boulenger, 1891, 233.
Habitat: Camaquam River; Paraguay River.

A3. *Pseudopimelodus acanthochira* Eigenmann & Eigenmann, ..E. & E., 114.
Habitat: Amazons from Para to Tabatinga.

4. *Pseudopimelodus villosus* Eigenmann MS.
Habitat: British Guiana.

5. *Pseudopimelodus albomarginatus* Eigenmann MS.
Habitat: Potaro River, British Guiana.

### ZUNGARO Bleeker.

Type: *Pimelodus zungaro* Humboldt.

Range: La Plata and Upper Amazon.

A1. *Zungaro zungaro* (Humboldt).
*Zungaro humboldtii* Bleeker.
Habitat: Marañon.

2. *Zungaro mangurus* (Valenciennes).
Habitat: La Plata.

### BREVIGLANIS Eigenmann MS.

Type: *Breviglanis frenata* Eigenmann.

Range: British Guiana.

1. *Breviglanis frenata* Eigenmann MS.
Habitat: Amatuk Cataract.

2. *Breviglanis melas* Eigenmann MS.
Habitat: British Guiana.

3. *Breviglanis phalacra* Eigenmann MS.
Habitat: Amatuk Cataract.

### LEPTOGLANIS Eigenmann MS.

Type: *Leptoglanis essequibensis* Eigenmann.

Range that of the single species.

1. *Leptoglanis essequibensis* Eigenmann MS.
Habitat: Middle Essequibo River.

### MYOGLANIS Eigenmann MS.

Type: *Myoglanis potaroensis* Eigenmann.

Range: Guiana and ? Uruguay.

1. *Myoglanis potaroensis* Eigenmann MS.
Habitat: Potaro River, British Guiana.

A2. *Myoglanis collettii* (Steindachner),[1] E. & E., 146.
Habitat: Maldonado.

### CHASMOCEPHALUS Eigenmann MS.

Type: *Chasmocephalus longior* Eigenmann.

Range: British Guiana.

1. *Chasmocephalus longior* Eigenmann MS.
Habitat: Central British Guiana.

2. *Chasmocephalus brevior* Eigenmann MS.
Habitat: Potaro River.

### HEPTAPTERUS Bleeker.

Type: *Pimelodus mustelinus* Valenciennes.

Range: La Plata to Rio Grande do Sul.

1. *Heptapterus mustelinus* (Valenciennes), St., 1907, 486.
Habitat: Santa Catharina and Rio Grande do Sul; Rio de La Plata.

2. *Heptapterus eigenmanni* Steindachner, E. & E., 144.
*H. mustelinus* Eigenmann, *non* Valenciennes.
Habitat: Maldonado.

3. *Heptapterus multiradiatus* von Ihering, v. I., 1907, 20.
Habitat: Alto da Serra, São Paulo.

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[1] I am not sure of the generic position of this species.

### ACENTRONICHTHYS Eigenmann & Eigenmann.

Type: *Acentronichthys leptos* Eigenmann & Eigenmann.

Range: Maldonado to Surinam.

1. *Acentronichthys leptos* Eigenmann & Eigenmann, ........E. & E., 145.
Habitat: São Matheos.

2. *Acentronichthys surinamensis* (Bleeker), E. & E., 146.
Habitat: Surinam.

### IMPARFINIS Eigenmann & Norris.

Type: *Imparfinis piperatus* Eigenmann & Norris.

*Rhamdioglanis* v. Ihering.

Range: South Eastern Brazil.

1. *Imparfinis piperatus* Eigenmann & Norris, ..........E. & N., 1900, 352.
Habitat: São Paulo, Brazil.

2. *Imparfinis frenatus* (von Ihering), v. I., 1907, 16.
Habitat: San Sebastiao.

3. *Imparfinis transfasciatus* (Ribeiro), R., 1908.
Habitat: Rio Ribeira.

### NANNOGLANIS Boulenger.

Type: *Nannoglanis fasciatus* Boulenger.

Range: Alto do Serra; Ecuador.

A1. *Nannoglanis fasciatus* Boulenger, E. & E., 147.
Habitat: Ecuador.

2. *Nannoglanis bifasciatus* Eigenmann & Norris, ........E. & N., 1900, 351.
Habitat: Alto do Serra, southeastern Brazil.

### RHAMDIA Bleeker and RHAMDELLA Eigenmann & Eigenmann.[1]

*Pteronotus* Swainson; *Pimelonotus* Gill; *Notoglanis* Günther.

Type: *Pimelodus quelen* Quoy & Gaimard.

Range: La Plata to Mexico and western Peru; Para to Lake Titicaca.

1. *Rhamdia velifer* (Humboldt), E. & E., 117.
Habitat: Magdalena river.

2. *Rhamdia argentina* (Humboldt), E. & E., 117.
Habitat: Magdalena river, near Chilloa.

3. ? *Rhamdia laukidi* Bleeker.
Habitat: Guiana.

4. *Rhamdia grunniens* (Humboldt), E. & E., 118.
Habitat: Orinoco.

5. *Rhamdia breviceps* (Kner), E. & E., 121.
Habitat: Marabitanos.

6. *Rhamdia schomburgkii* Bleeker, E. & E., 122.
Habitat: Guiana; Brazil.

A7. *Rhamdia bathyurus* Cope, E. & E., 122.
Habitat: Marañon.

A8. *Rhamdia obesa* Eigenmann & Eigenmann, ............E. & E., 122.
Habitat: Teffé.

A9. *Rhamdia sebæ* (Cuvier & Valenciennes), ............E. & E., 123.
*Pimelodus stegelichii* and *musculus* Müller & Troschel; *Pimelodus holomelas* and *mülleri* Günther.
Habitat: Rio de Janeiro and Paraguay to Rio Magdalena and Tabatinga.

A10. *Rhamdia sebæ kneri* (Steindachner), E. & E., 126.
Habitat: Upper Paraguay and northward.

11. *Rhamdia vilsoni* Gill.
Habitat: Trinidad.

A12. *Rhamdia humilis* (Günther), E. & E., 126.
Habitat: Marañon to Venezuela.

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[1] The genera *Rhamdia* and *Rhamdella* (type *eriarcha*) are both valid, but since not all species have been examined in regard to their generic characters, they are here temporarily combined.

13. **Rhamdia cinerascens** (Günther), E. & E., 127.
Habitat: Guayaquil; Esmeraldas; Rio Saule; Rio Peripa.

A14. *Rhamdia pentlandi* (Cuvier & Valenciennes), ............E. & E., 127.
Habitat: Peruvian Andes.

A15. *Rhamdia quelen* (Quoy & Gaimard), E. & E., 127.
*Heterobranchus sextentaculatus* Agassiz; *Pimelodus sellonis* Müller & Troschel; *? Pimelodus bahianus* Castelnau; *Silurus sapipoca* Natterer; *Pimelodus wuchereri* Günther; *Pimelodus quelen cuprea* Steindachner; *Pimelodus cuyabæ* Steindachner.
Habitat: Rio de La Plata to the Amazon and Guiana.

A16. *Rhamdia parvani* Boulenger, Boulenger, 1898, 7.
Habitat: Rio Santiago; Rio Zamora and Rio Bamboiza.

A17. *Rhamdia multiradiata* (Kner), E. & E., 130.
*Pimelodus arekaima* Schomburgk (part).
Habitat: Amazons and tributaries and northward.

18. *Rhamdia sapo* (Valenciennes), E. & E., 130.
Habitat: La Plata to Rio Grande do Sul.

19. *Rhamdia hilarii* (Cuvier and Valenciennes), ............E. & E., 131.
Habitat: Rio San Francisco and its tributaries; Porto Alegre south to Rio de La Plata.

20. *Rhamdia depressa* Barbour & Cole, Regan, 1907–8, 131.
*Rhamdia boucardi* Regan.
Habitat: Yucatan.

21. **Rhamdia wagneri** (Günther), Regan, 1907–8, 13.
*Pimelodus cinerascens* Kner & Steindachner, *non* Günther; *Rhamdia bransfordi* Gill.
Habitat: Eastern and western slopes of Central America; Tabasco, Mexico.

A22. *Rhamdia longicauda* (Boulenger), E. & E., 135.
Habitat: Eastern Ecuador.

A23. *Rhamdia dorsalis* (Gill), E. & E., 135.
Habitat: Marañon.

A24. *Rhamdia poeyi* Eigenmann & Eigenmann, ..............E. & E., 135.
Habitat: Goyaz.

A25. *Rhamdia tenella* Eigenmann & Eigenmann, ..........E. & E., 136.
Habitat: Cudajas.

26. *Rhamdia brachypterus* (Cope), Meek, 21.
Habitat: Mountain streams of south-central Vera Cruz.

27. *Rhamdia heteracanthus* Regan, Regan, 1907–8, 134.
Habitat: Costa Rica.

28. *Rhamdia rogersi* Regan, Regan, 1907–8, 136.
Habitat: Costa Rica.

29. *Rhamdia regani* Meek, Meek, 1907a, 144.
Habitat: Costa Rica.

(RHAMDELLA Eigenmann & Eigenmann.[1])
(Type: *Rhamdella eriarcha* Eigenmann & Eigenmann.)
(Range: Rio Janeiro to Mexico; on both slopes of Central America and Mexico.)

30. *Rhamdia foina* (Müller & Troschel), E. & E., 126.
Habitat: Guiana.

31. *Rhamdia microcephalus* (Rheinhardt), E. & E., 138.
Habitat: Rio das Velhas.

A32. *Rhamdia notata* (Schomburgk), E. & E., 139.
Habitat: Rio Branco.

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[1] I am not sure of the genus of numbers 38–52. Some of these are probably *Rhamdia*.

33. *Rhamdia eriarcha* Eigenmann & Eigenmann, .......... E. & E., 139.
Habitat: Rio Grande do Sul.

34. *Rhamdia exudans* (Jenyns), E. & E., 140.
Habitat: ? Rio de Janeiro.

35. *Rhamdia ignobilis* Steindachner, St. 1907a, 484.
Habitat: Rio Cubatao.

36. *Rhamdia jenynsii* (Günther), E. & E., 140.
Habitat: Rio de Janeiro to the Rio de La Plata.

37. **Rhamdia gilli** Starks, Starks, 1906, 767.
Habitat: Rio Eten, Peru.

38. *Rhamdia minuta* (Lütken), E. & E., 142.
Habitat: Rio de Janeiro; Macacos.

39. *Rhamdia straminea* Cope, ...... 1893.
Habitat: Rio Grande do Sul.

40. **Rhamdia parryi** Eigenmann & Eigenmann, ........ Regan, 1907–8, 130.
Habitat: Rio Zaneleneo near Tonala, Mexico.

41. *Rhamdia petenensis* (Günther), Regan, 1907–8, 132.
Habitat: Lake Peten and Chiapas, Mexico.

42. **Rhamdia baronis mülleri** (Troschel),
Habitat: Pacific slope of Mexico.

43. **Rhamdia guatemalensis** (Günther), Regan, 1907–8, 132.
*R. oaxacæ* Meek.
Habitat: Huamuchal, Guatemala and Nicaragua.

44. *Rhamdia salvini* (Günther), Regan, 1907–8, 135.
Habitat: Rio San Geronimo, Guatemala.

45. *Rhamdia policaulus* (Günther), Regan, 1907–8, 136.
Habitat: Rio San Geronimo, Guatemala.

46. *Rhamdia managuensis* (Günther), Regan, 1907–8, 133.
Habitat: Lake Managua.

47. *Rhamdia hypselurus* (Günther), Regan, 1907–8, 134.
Habitat: Mexico.

48. *Rhamdia motaguensis* (Günther), Regan, 1907–8, 130.
Habitat: Rio Motagua.

49. *Rhamdia laticauda* (Heckel), Regan, 1907–8, 136.
Habitat: Mexico.

50. *Rhamdia nicaraguensis* (Günther), Regan, 1907–8, 130.
Habitat: Lake Nicaragua.

51. *Rhamdia micropterus* (Günther), Regan, 1907–8, 133.
Habitat: Rio San Geronimo.

52. *Rhamdia godmani* (Günther), Günther, V, 124.
*? R. sacrificii* Barbour & Cole.
Habitat: Lower Vera Paz; Mexico; Rio Motagua.

53. *Rhamdia sacrificii* Barbour & Cole, B. & C., 1906, 156.
Habitat: Yucatan.

54. *Rhamdia barbata* Meek, M., 1907, 106.
Habitat: Managua and Rio San Francisco, Nicaragua.

55. *Rhamdia brachycephalus* Regan, R., 1907–8, 135
Habitat: Guatemala.

56. *Rhamdia underwoodi* Regan, R., 1907–8, 135.
Habitat: Costa Rica.

### TYPHLOBAGRUS Ribeiro.

Type: *Typhlobagrus kronei* Ribeiro.
Range that of the single species.

1. *Typhlobagrus kronei* Ribeiro.
Habitat: Caves of Santa Catharina.

### PHREATOBIUS Gœldi.[1]

Type: *Phreatobius cisternarum* Gœldi.
Range that of the single species.

A1. *Phrenatobius cisternarum* Gœldi.

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[1] I am not sure of the zoölogical position of this subterranean fish.

Habitat: Subterranean waters of Marajo.

### PIMELODUS Lacépède.

*Pseudariodes* Bleeker; *Pseudorhamdia* Bleeker.

Type: *Silurus clarias* Bloch.

Range: Rio de La Plata to Panama.

A1. *Pimelodus cyanostigma* (Cope), E. & E., 164.

Habitat: Pebas, Ecuador.

2. *Pimelodus quadrimaculatus* (Bloch), E. & E., 164.

Habitat: America.

A3. *Pimelodus ornatus* Kner, E. & E., 168.

Habitat: Paraguay; Brazilian Amazons and northward.

4. *Pimelodus albicans* (Valenciennes), E. & E., 169.

Habitat: Rio de La Plata to Matto Grosso.

A5. *Pimelodus pictus* Steindachner, E. & E., 170.

Habitat: Marañon to Hyaray.

A6. **Pimelodus clarias** (Bloch), E. & E., 171.

*Pimelodus maculatus* Lacépède; *Pimelodus rigidus* Spix; *Pimelodus blochii* Cuvier & Valenciennes; *Pimelodus arekaima* Schomburgk; *Mystus ascita* Gronow; *Pimelodus macronema* Bleeker; *Pseudariodes pantherinus* Lütken; *Pseudorhamdia piscatrix* Cope; *Piramutana macrospila* Günther.

Habitat: Rio de La Plata to Panama.

7. *Pimelodus valenciennis* Kröyer, E. & E., 180.

*Pimelodus nigribarbis* Boulenger.

Habitat: Rio de La Plata to Paraguay and San Francisco.

8. *Pimelodus grosskopfii* Steindachner, E. & E., 180.

Habitat: Magdalena Basin.

A9. *Pimelodus altipinnis* Steindachner, E. & E., 180.

Habitat: Amazon and northward.

A10. *Pimelodus fur* (Reinhardt), E. & E., 182.

*Pimelodus maculatus* Kner, *non* Valenciennes; *Pimelodus microstoma* Steindachner.

Habitat: Rio Paraguay; Rio San Francisco and Amazon.

11. *Pimelodus spegazzinii* Perugia, Perugia, 1891, 32.

Habitat: Rio Durango.

12. *Pimelodus argenteus* Perugia, Perugia, 1891, 31.

Habitat: Rio de La Plata; Rio Parana.

### GŒLDIELLA Eigenmann & Norris.

Type: *Pimelodus eques* Müller & Troschel.

Range that of the single species.

A1. *Gœldiella eques* (Müller & Troschel), E. & E., 166.

Habitat: Brazilian Amazons and northward.

### IHERINGICHTHYS Eigenmann & Norris.

Type: *Pimelodus labrosus* Kröyer.

Range: Rio de La Plata Basin.

1. *Iheringichthys labrosus* (Kröyer), E. & E., 180.

Habitat: Rio de La Plata Basin.

2. *Iheringichthys megalops* Eigenmann & Ward, ......E. & W., 1907, 115.

Habitat: Bahia Negra on the Paraguay.

### PIMELODELLA Eigenmann & Eigenmann.

Type: *Pimelodus cristatus* Müller & Troschel.

Range: La Plata to Panama and western Ecuador.

A1. *Pimelodella cristata* (Müller & Troschel), .............. E. & E., 150.

*Pimelodus agassizii* Steindachner; *Pimelodus ophthalmicus* Cope.

Habitat: North of the Mucuri to Peru and Ecuador.

A2. *Pimelodella wesselii* (Steindachner), E. & E., 152.
Habitat: Rio Puty to Cudajas and Essequibo.

A3. *Pimelodella gracilis* (Valenciennes), E. & E., 153.
Habitat: Rio de La Plata to the Orinoco.

4. *Pimelodella pectinifer* Eigenmann & Eigenmann, ........E. & E., 154.
Habitat: Rio Parahyba.

5. **Pimelodella modesta** (Günther), E. & E., 155.
Habitat: Western Ecuador and eastern Panama.

6. **Pimelodella elongata** (Günther), E. & E., 155.
Habitat: Pacific slope of Ecuador.

7. **Pimelodella grisea** Regan, Regan, 1903.
Habitat: Durango; Sapayo and Vaqueria rivers, northwest Ecuador.

A8. *Pimelodella lateristriga* (Müller & Troschel), ..........E. & E., 156.
Habitat: Atlantic slope, north of Rio Grande do Sul; Paraguay.

9. *Pimelodella hartii* (Steindachner), E. & E., 158.
Habitat: Rio Parahyba.

A10. *Pimelodella buckleyi* (Boulenger), Boul., 1887, 275.
Habitat: Canelos.

11. *Pimelodella eigenmanni* Boulenger, E. & E., 158.
*Pimelodella buckleyi* Eigenmann & Eigenmann, *non* Boulenger.
Habitat: Rio Parahyba and Macacos.

12. *Pimelodella vittata* (Kröyer), E. & E., 159.
Habitat: Atlantic slope streams of Minas Geraes and Bahia.

13. *Pimelodella tæniophora* Regan, Regan, 1903, 625.
*Pimelodella lateristriga* Boulenger, *non* Müller & Troschel.
Habitat: Paraguay River.

14. *Pimelodella chagresi* (Steindachner), E. & E., 160.
Habitat: Rio Chagres and its tributaries.

15. *Pimelodella brasiliensis* (Steindachner), E. & E., 162.
Habitat: Rio Parahyba.

16. *Pimelodella mucosa* Eigenmann & Ward, ................1907, 114.
Habitat: Paraguay.

17. **Pimelodella yucensis** Steindachner, Steind., 1902, 47.
Habitat: Pacasmaya, north Peru.

18. *Pimelodella meeki* Eigenmann, Meek, 1905, 24.
*P. eigenmanni* Meek, *non* Boulenger.
Habitat: São Paulo.

19. *Pimelodella megalops* Eigenmann MS.
Habitat: Central British Guiana.

20. *Pimelodella macturkii* Eigenmann MS.
Habitat: Coastwise streams of British Guiana.

### BERGIARIA Eigenmann & Norris.

Type: *Pimelodus westermanni* Reinhardt.
*Bergiella* Eigenmann & Norris. (Preoc.)
Range: Rio San Francisco to La Plata.

1. *Bergiaria westermanni* (Reinhardt), E. & E., 180.
Habitat: Rio das Velhas.

2. *Bergiaria platana* (Steindachner).
Habitat: La Plata.

### CONORHYNCHOS Bleeker.

Type: *Pimelodus conirostris* Cuvier & Valenciennes.
Range: Porto Seguro and Rio San Francisco to Yucatan.

1. *Conorhynchos conirostris* (Cuvier & Valenciennes), ..........E. & E., 185.
Habitat: Rio San Francisco Basin.

A2. *Conorhynchos glaber* Steindachner, E. & E., 185.
Habitat: Porto Seguro.

3. *Conorhynchos nelsoni* Evermann & Goldsborough, .......... Meek, 19.
Habitat: Rio Usumacinta, Montecristo, Chiapas.

### BAGROPSIS Lütken.

Type: *Bagropsis reinhardti* Lütken.
Range that of the single species.

1. *Bagropsis reinhardti* Lütken, E. & E., 186.
Habitat: Rio das Velhas.

### PLATYNEMATICHTHYS Bleeker.

Type: *Bagrus punctulatus* Kner.
Range: Amazons and tributaries.

A1. *Platynematichthys punctulatus* (Kner), E. & E., 187.
*Bagrus nigripunctatus* Kner.
Habitat: Rio Guaporé to Rio Branco.

A2. *Platynematichthys araguayensis* (Castelnau), ............ E. & E., 187.
Habitat: Araguay.

### PHRACTOCEPHALUS Agassiz.

Type: *Phractocephalus bicolor* Agassiz.
Range that of the single species.

A1. *Phractocephalus hemiliopterus* (Bloch & Schneider), ...... E. & E., 188.
*Phractocephalus bicolor* Agassiz.
Habitat: Amazons and northward.

### SCIADES Müller & Troschel.

*Leiarius, Sciadichthys* Bleeker.
Type: *Bagrus pictus* Müller & Troschel.
Range: Amazons and tributaries; Paraguay.

(SCIADES.)

A1. *Sciades pictus* Müller & Troschel, E. & E., 191.
*Arius longibarbis* Castelnau.
Habitat: Amazon; Paraguay.

(SCIADEOIDES Eigenmann & Eigenmann.)

(Type: *Sciades marmoratus* Gill.)

A2. *Sciades marmoratus* Gill, E. & E., 192.
Habitat: Marañon.

### NEMUROGLANIS Eigenmann & Eigenmann.

Type: *Nemuroglanis lanceolatus* Eigenmann & Eigenmann.

A1. *Nemuroglanis lanceolatus* E. & E., E. & E., 193.
Habitat: Jutahy.

### BRACHYPLATYSTOMA Bleeker.

*Piramutana, Piratinga,* and *Malacobagrus* Bleeker.
Type: *Platystoma vaillanti* Cuvier & Valenciennes.
Range: Parahyba through Amazons.

A1. *Brachyplatystoma filamentosum* Lichtenstein, ...... Steind., 1908c, 112.
*Piratinga pira-aiba* Gœldi; *B. gœldii* Eigenmann & Bean; *Platystoma mucosa* Vaillant; *Platystoma verrucosum* Boulenger.
Habitat: Brazil; Para.

A2. *Brachyplatystoma piramuta* (Kner), E. & E., 186.
Habitat: Amazon and its tributaries.

A2. *Brachyplatystoma vaillanti* (Cuvier & Valenciennes), ...... E. & E., 196.
*Platystoma affine* Cuvier & Valenciennes.
Habitat: Eastern slopes north of Rio Parahyba.

A3. *Brachyplatystoma reticulatum* (Kner), E. & E., 198.
*Bagrus goliath* Kner in part (the two larger specimens mentioned).
Habitat: Rio Tocantins; Amazon; Rio Madeira.

A4. *Brachyplatystoma rousseauxii* (Castelnau), ............... E. & E., 198.
*Bagrus goliath* Kner (the type only).
Habitat: Amazon and its tributaries.

A5. *Brachyplatystoma juruense* Boulenger Boul., Trans. Zool. Soc., XIV, 421.
Habitat: Rio Jurua.

6\. *Brachyplatystoma parnahybæ* Steindachner,[1] . . . . . . . . . . . St., 1908*d*, 126.
Habitat: Parnahyba.

A7. *Brachyplatystoma paraense* Steindachner, . . . . . . . . . . . . . . . . . St., 1909*a*.
Habitat: Para.

TÆNIONEMA Eigenmann & Bean.

Type: *Tænionema steeri* E. & B.

A1. *Tænionema steeri* Eigenmann & Bean.
Habitat: Lower Amazon.

A2. *Tænionema platynema* (Boulenger), Boul., 1898, 477.
Habitat: Para.

DUOPALATINUS Eigenmann & Eigenmann.

Type: *Platystoma emarginatum* Cuvier & Valenciennes.

1\. *Duopalatinus emarginatus* (Cuvier & Valenciennes), . . . . . . E. & E., 200.
Habitat: Rio San Francisco Basin.

A2. *Duopalatinus gœldii* Steindachner, St., 1908*a*.
Habitat: Rio Purus.

PAULICEA von Ihering.

Type: *Paulicea jahu* v. Ihering.
Range: La Plata and Amazon Basins.

1\. *Paulicea jahu* v. Ihering.
Ihering, Proc. Acad. Nat. Sci. Phila., 1898, 108.
Habitat: Rio Tiete at São Paulo.

A2. *Paulicea lütkeni* (Steindachner), E. & E., 201.
Habitat: Amazon.

STEINDACHNERIA Eigenmann & Eigenmann.

Type: *Steindachneria amblyura* Eigenmann & Eigenmann.
Range: Rios Doce, Jequitinhonha and Parahyba.

1\. *Steindachneria amblyura* Eigenmann & Eigenmann, . . . . . . . . E. & E., 203.
Habitat: Rio Jequitinhonha.

2\. *Steindachneria doceana* Eigenmann & Eigenmann, . . . . . . . . E. & E., 204.
Habitat: Rio Doce.

3\. *Steindachneria parahybæ* Steindachner, E. & E., 204.
Habitat: Rio Parahyba.

HEMISORUBIM Bleeker.

Type: *Platystoma platyrhynchos* Cuvier & Valenciennes.

A1. *Hemisorubim platyrhynchos* (Cuvier & Valenciennes), . . . . E. & E., 206.
Habitat: Orinoco; Amazons; Paranahyba: Paraguay.

PSEUDOPLATYSTOMA Bleeker.

*Hemiplatystoma* Bleeker.
Type: *Silurus fasciatus* Linnæus.
Range: La Plata to the Magdalena.

A1. *Pseudoplatystoma fasciatum* (Linnæus), . . . . . . . . . . . . E. & E., 209.
*Platystoma truncatum* Agassiz; *Platystoma punctifer* Castelnau.
Habitat: Amazons to Rio Magdalena.

A2. *Pseudoplatystoma fasciatum nigricans* Eigenmann & Eigenmann, E. & E., 210.
Habitat: Xingu.

A3. *Pseudoplatystoma fasciatum brevifile* Eigenmann & Eigenmann, E. & E., 210.
Habitat: Goyaz.

A4. *Pseudoplatystoma fasciatum intermedium* Eigenmann & Eigenmann, E. & E., 210.
Habitat: Obidos; Rio Puty.

A5. *Pseudoplatystoma fasciatum reticulatum* Eigenmann & Eigenmann, E. & E., 211.
Habitat: Rio Negro.

A6. *Pseudoplatystoma tigrinum* (Cuvier & Valenciennes), . . . . . . E. & E., 211.
Habitat: Amazon and northward.

A7. *Pseudoplatystoma coruscans* Agassiz, E. & E., 211.

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[1] *Brachyplatystoma affine* Steindachner, *non Platystoma affine* C. & V., 1908d, 128.

*Sorubim caparary* Spix; *Platystoma pardalis, orbignianum* Valenciennes; *Platystoma punctatum* Cuvier & Valenciennes; *Platystoma forschhammeri* Reinhardt.

Habitat: Rio de La Plata to Paraguay; Rio San Francisco Basin.

### SORUBIM Spix.

Type: *Silurus lima* Bloch & Schneider.

Range that of the single species.

A1. *Sorubim lima* (Bloch & Schneider), E. & E., 213.

*Sorubim infraocularis* Spix; *Platystoma luceri* Weyenbergh.

Habitat: Rio de La Plata; Amazons to the Rio Magdalena.

### SORUBIMICHTHYS Bleeker.

Type: *Sorubim jandia* Spix.

Range: Amazons and Orinoco.

A1. *Sorubimichthys planiceps* (Agassiz), E. & E., 215

*Sorubim piranaca* Spix; *Platystoma artedii* Günther; *Sorubimichthys ortoni* Gill.

Habitat: Amazon and Orinoco Basins.

A2. *Sorubimichthys spatula* (Agassiz), E. & E., 217.

*Sorubim jandia* Spix.

Habitat: Amazon?

A3. *Sorubimichthys gigas* (Günther), E. & E., 217.

Habitat: Huallaga.

### PLATYSTOMATICHTHYS Bleeker.

Type: *Platystoma sturio* Kner.

Range that of the single species.

A1. *Platystomatichthys sturio* (Kner), E. & E., 218.

Habitat: Amazon Basin.

## Subfamily DORADINÆ.

### PHYSOPYXIS Cope.

Type: *Physopyxis lyra* Cope.

Range that of the single species.

A1. *Physopyxis lyra* Cope, . . E. & E., 220.

Habitat: Ambyiacu River.

### DORAS Lacépède.

*Pterodoras, Platydoras* Bleeker; *Zathorax* Cope.

Type: *Silurus costatus* Linnæus.

Range: Rios Paraguay and Francisco to Rio Magdalena.

### (LITHODORAS Bleeker.)

(Type: *Lithodoras lithogaster* Bleeker.)

A1. *Doras dorsalis* Cuvier & Valenciennes, E. & E., 225.

*Doras carinatus* Valenciennes, *non Silurus carinatus* Linnæus; *Doras papilionatus* Filippi; *Doras lithogaster* Heckel.

Habitat: Para; Rio Negro and Cayenne.

### (DORAS Lacépède.)

A2. *Doras uranoscopus* Eigenmann & Eigenmann, . . . . . . . . . . E. & E., 228.

Habitat: Lake Hyanuary.

A3. *Doras granulosus* Valenciennes, E. & E., 229.

*Doras murica* Natterer.

Habitat: La Plata Basin; Amazon.

4. *Doras maculatus* Valenciennes.

Habitat: La Plata Basin.

5. *Doras longispinis* Steindachner, E. & E., 231.

Habitat: Magdalena Basin.

A6. *Doras regani* Steindachner, St., 1908.

Habitat: Para.

7. *Doras albomaculatus* Peters, E. & E., 231.

Habitat: Calabozo, Venezuela.

8. *Doras helicophilus* Günther, E. & E., 231.

Habitat: Surinam.

9. *Doras dentatus* Kner, ....E. & E., 231.
Habitat: Surinam.

10. *Doras nebulosus* Eigenmann & Kennedy, .................1903, 500.
Habitat: Paraguay Basin.

A11. *Doras costatus* (Linnæus), E. & E., 231.
Habitat: Rio San Francisco and Paraguay north to Guiana.

A12. *Doras armatulus* Cuvier & Valenciennes, ...............E. & E., 234.
Habitat: Paraguay and Rio Preto to Calabozo and Huallaga.

A13. *Doras hancockii* Cuvier & Valenciennes, ...............E. & E., 234.
*Doras costatus* Hancock, *non* Linnæus.
Habitat: Rio Cupai.

A14. *Doras brachiatus* Cope, . . E. & E., 234.
Habitat: Marañon.

(ACANTHODORAS Bleeker.)

(Type: *Silurus cataphractas* Linnæus.)

A15. *Doras cataphractus* (Linnæus), E. & E., 234.
*Cataphractus americanus* Bloch & Schneider; *Doras blochii* Cuvier & Valenciennes; *? Doras brunneus* Schomburgk; *Doras polyramma* and *polygramma* Heckel; *Callichthys asper* Gronow.
Habitat: Central Brazil; Guiana.

A16. *Doras spinosissimus* Eigenmann & Eigenmann, ........E. & E., 235.
Habitat: Coary.

17. *Doras marmoratus* Reinhardt, E. & E., 237.
Habitat: Rio San Francisco Basin.

(AMBLYDORAS Bleeker.)

(Type: *Doras affinis* Kner.)

A18. *Doras affinis* Kner, ....E. & E., 238.
*Doras truncatus* Bleeker.
Habitat: Rio Branco and Rio Guaporé.

A19. *Doras weddellii* Castelnau, E. & E., 239.
*Doras grypus* Cope.
Habitat: Paraguay; Amazons and tributaries, chiefly westward.

(CENTROCHIR Agassiz.)

(Type: *Doras crocodili* Humboldt.)

20. *Doras crocodili* Humboldt, E. & E., 241.
Habitat: Rio Magdalena.

(AGAMYXIS Cope.)

(Type: *Doras pectinifrons* Cope.)

21. *Doras castaneo-ventris* Schomburgk, E. & E., 241.
Habitat: British Guiana.

A22. *Doras pectinifrons* Cope, E. & E., 241.
Habitat: Eastern Ecuador.

A23. *Doras flavopictus* Steindachner, St., 1908*a*.
Habitat: Iquitos.

(ASTRODORAS Bleeker.)

(Type: *Doras asterifrons* Heckel.)

A24. *Doras asterifrons* Heckel, E. & E., 241.
Habitat: Amazons and tributaries.

A25. *Doras heckelii* Kner, . . E. & E., 243.
Habitat: Solimoens.

A26. *Doras monitor* Cope, . . E. & E., 245.
Habitat: Amazon.

A27. *Doras nauticus* Cope, . . E. & E., 246.
Habitat: Nauta.

OXYDORAS Kner.

*Pseudodoras* and *Rhinodoras* Bleeker.
Type: *Doras niger* Valenciennes.
Range: La Plata and Paraguay; Rio San Francisco; Amazons and Guianas.

A1. *Oxydoras niger* (Valenciennes), E. & E., 247.
*Doras humboldti* Agassiz; *Corydoras edentatus* Spix; *Rhinodoras priono-*

*mus* Cope; *Rhinodoras teffeanus* Steindachner.

Habitat: Amazons and northward; Rio San Francisco.

2. *Oxydoras knerii* Bleeker, . . E. & E., 249.

Habitat: Cujaba to Asuncion on the Paraguay.

3. *Oxydoras eigenmanni* Boulenger, Boul., 1896, 28.

Habitat: Paraguay Basin.

4. *Oxydoras d'orbignyi* Kröyer, E. & E., 249.

Habitat: Rio de La Plata.

A5. *Oxydoras amazonum* (Steindachner), E. & E., 250.

Habitat: Teffé.

### HEMIDORAS Bleeker.

Type: *Doras stenopeltis* Kner.

Range: Rio Puty; Rio Paraguay; Amazons and Guiana.

A1. *Hemidoras trachyparia* Boulenger, Boul. 1898, 423.

Habitat: Rio Jurua.

A2. *Hemidoras nattereri* Steindachner, E. & E., 253.

Habitat: Solimoens.

3. *Hemidoras paraguayensis* Eigenmann & Ward, . . . . . . . . . . . .E., 1907*c*, 116.

Habitat: Rio Paraguay.

A4. *Hemidoras bachi* Boulenger, 1898, 423.

Habitat: Rio Jurua.

A5. *Hemidoras brevis* (Kner), E. & E., 254.

Habitat: Solimoens and Marañon.

A6. *Hemidoras fimbriatus* (Kner), E. & E., 255.

Habitat: Rio Guaporé.

A7. *Hemidoras punctatus* (Kner), E. & E., 255.

Habitat: Rio Guaporé.

A8. *Hemidoras lipophthalmus* (Kner), E. & E., 255.

Habitat: Rio Capin and Rio Negro.

A9. *Hemidoras stenopeltis* (Kner), E. & E., 255.

Habitat: Amazon and Solimoens.

A10. *Hemidoras trimaculatus* Boulenger, Boul., 1898, 422.

Habitat: Rio Jurua.

A11. *Hemidoras stübelii* (Steindachner), E. & E., 257.

Habitat: Huallaga.

A12. *Hemidoras morei* (Steindachner), E. & E., 257.

Habitat: Rio Negro.

A13. *Hemidoras elongatus* Boulenger, 1898, 424.

Habitat: Rio Jurua.

A14. *Hemidoras humeralis* (Kner), E. & E., 257.

Habitat: Rio Negro.

A15. *Hemidoras carinatus* (Linnæus), E. & E., 258.

*Doras oxyrhynchus* Valenciennes.

Habitat: Guianas; Calderon.

16. *Hemidoras microstomus* Eigenmann MS.

Habitat: Essequibo River.

### (HASSAR Eigenmann & Eigenmann.)

(Type: *Oxydoras orestes* Steindachner.)

Range: Rio Puty and Amazons.

17. *Hemidoras micropœus* Eigenmann MS.

Habitat: Demarara.

18. *Hemidoras notospilus* Eigenmann MS.

Habitat: Crab Falls, Essequibo River.

19. *Hemidoras leporhinus* Eigenmann MS.

Habitat: Central British Guiana.

A20. *Hemidoras orestes* (Steindachner), E. & E., 258.

Habitat: Xingu and Huytahy.

21. *Hemidoras affinis* (Steindachner), E. & E., 258.

Habitat: Rio Puty.

A22. *Hemidoras wilderi* Kindle, Kindle, 1894, 251.

Habitat: Trocera on the Tocantins.

LEPTODORAS Boulenger.

Type: *Oxydoras acipenserinus* Günther.

Range: Xeberos to Rio Jurua.

A1. *Leptodoras acipenserinus* (Günther), E. & E., 255.

Habitat: Xeberos.

A2. *Leptodoras juruensis* Boulenger, Boul., 1898, 478.

Habitat: Rio Jurua.

3. *Leptodoras linnelli* Eigenmann MS.

Habitat: British Guiana.

### Subfamily AUCHENIPTERINÆ.

ASTEROPHYSUS Kner.

Type: *Asterophysus batrachus* Kner.

Range that of the single species.

A1. *Asterophysus batrachus* Kner, E. & E., 263.

Habitat: Marabitanos.

TRACHELYOPTERICHTHYS Bleeker.

Type: *Trachelyopterus tæniatus Kner.*

Range that of the single species.

A1. *Trachelyopterichthys tæniatus* (Kner), E. & E., 263.

Habitat: Solimoens and tributaries.

TRACHELYOPTERUS Cuvier & Valenciennes.

Type: *Trachelyopterus coriaceus* Cuvier & Valenciennes.

Range: Amazons; Cayenne.

A1. *Trachelyopterus coriaceus* Cuvier & Valenciennes, ........E. & E., 264.

Habitat: Cayenne; Obidos; Porto do Moz; Paraguay.

A2. *Trachelyopterus maculosus* Eigenmann & Eigenmann, ......E. & E., 265.

Habitat: Porto do Moz.

WERTHEIMERIA Steindachner.

Type: *Wertheimeria maculata* Steindachner.

Range that of the single species.

1. *Wertheimeria maculata* Steindachner, E. & E., 265.

Habitat: Jequitinhonha.

CENTROMOCHLUS Kner.

Type: *Centromochlus megalops* Kner.

Range: Amazons and Guiana.

1. *Centromochlus oncinus* (Schomburgk), E. & E., 266.

Habitat: Rio Padauiri.

A2. *Centromochlus heckelii* (Filippi), E. & E., 267.

*Centromochlus megalops* Kner.

Habitat: Amazons and tributaries.

A3. *Centromochlus steindachnerii* Gill, E. & E., 268.

Habitat: Marañon.

A4. *Centromochlus intermedius* Steindachner, ................E. & E., 269.

Habitat: Amazon; Solimoens and tributaries.

A5. *Centromochlus perugiæ* Steindachner, E. & E., 270.

Habitat: Canelos.

A6. *Centromochlus aulopygius* Kner. E. & E., 270.

Habitat: Rio Guaporé; Cudajas; Essequibo.

GLANIDIUM Lütken.

Type: *Glanidium albescens* Lütken.

A1. *Glanidium albescens* Lütken, E. & E., 270.

Habitat: Coast streams from Rio Janeiro to the Amazon.

TRACHYCORYSTES Bleeker.

Type: *Trachycorystes typus* Bleeker.

*Parauchenipterus* Bleeker.

Range: Amazons to Guiana and Magdalena.

1. *Trachycorystes glaber* (Steindachner), E. & E., 275.

Habitat: Demarara.

A2. *Trachycorystes isacanthus* (Cope), E. & E., 275.

Habitat: Marañon.

3. *Trachycorystes insignis* (Steindachner), E. & E., 275.

Habitat: Magdalena.

4. *Trachycorystes obscurus* (Günther), E. & E., 275.

Habitat: Essequibo.

5. *Trachycorystes magdalenæ* (Steindachner), ..............E. & E., 275.

Habitat: Magdalena.

6. *Trachycorystes trachycorystes* (Cuvier & Valenciennes), ......E. & E., 276.

*Trachycorystes typus* Bleeker.

Habitat: Brazil.

A7. *Trachycorystes ceratophysus* (Kner), E. & E., 276.

Habitat: Guaporé; Rios Negro and Branco.

A8. *Trachycorystes porosus* Eigenmann & Eigenmann, ........E. & E., 276.

Habitat: Brazil.

9. *Trachycorystes striatulus* Steindachner, E. & E., 277.

Habitat: Mouths of rivers draining eastern Minas Geraes; Paraguay.

A10. *Trachycorystes brevibarbus* (Cope), E. & E., 279.

Habitat: Marañon.

A11. *Trachycorystes galeatus* (Linnæus), E. & E., 279.

*Auchenipterus maculatus, immaculatus* and *punctatus* Cuvier & Valenciennes; *Auchenipterus lacustris* Lütken.

Habitat: Rio Velhas to the Orinoco and Paraguay.

12. *Trachycorystes robustus* Günther, E. & E., 281.

Habitat: Demarara.

A13. *Trachycorystes analis* Eigenmann & Eigenmann, ........E. & E., 281.

Habitat: Arary ?.

### AUCHENIPTERICHTHYS Bleeker.

Type: *Auchenipterus thoracatus* Kner.

Range: Amazons and tributaries.

A1. *Auchenipterichthys thoracatus* (Kner), E. & E., 282.

Habitat: Solimoens and tributaries. (Coary; Hyarary; Guaporé.)

A2. *Auchenipterichthys longimanus* (Günther), ..............E. & E., 284.

Habitat: Southern tributaries of the Amazon.

### PSEUDAUCHENIPTERUS Bleeker.

Type: *Pseudauchenipterus nodosus* (Bloch.)

*Felichthys* Swainson.

Range: Lower courses of rivers from Jequitinhonha to Guiana.

1. *Pseudauchenipterus jequitinhonhæ* (Steindachner), ......E. & E., 286.

Habitat: Jequitinhonha.

2. *Pseudauchenipterus flavescens* Eigenmann & Eigenmann, ..E. & E., 288.

Habitat: Rio San Francisco.

A3. *Pseudauchenipterus affinis* (Steindachner), ..............E. & E., 289.

Habitat: Para; mouths of streams draining eastern Minas Geraes.

A4. *Pseudauchenipterus nodosus* (Bloch), E. & E., 290.

*Auchenipterus furcatus* Cuvier & Valenciennes.

Habitat: Bahia; Para; Guiana.

5. *Pseudauchenipterus guppyi* Regan, 1906*c*, 387.

Habitat: Trinidad.

6. *Pseudauchenipterus pasecæ* Regan, 1906*c*, 387.

Habitat: Trinidad.

### EPAPTERUS Cope.

Type: *Epapterus dispilurus* Cope.

Range that of the single species.

1. *Epapterus dispilurus* Cope, E. & E., 293.
*Euanemus longipinnis* Steindachner.
Habitat: Upper Amazon.

### AUCHENIPTERUS Cuvier & Valenciennes.

Type: *Hypophthalmus nuchalis* Spix.
*Euanemus* Müller & Troschel.
Range: Paraguay to Surinam.

A1. *Auchenipterus nuchalis* (Spix), E. & E., 295.
*Auchenipterus dentatus* Cuvier & Valenciennes; *Epapterus colymbetes* Müller & Troschel.
Habitat: Amazons; Surinam.

A2. *Auchenipterus fordicei* Eigenmann & Eigenmann, ........E. & E., 207.
Habitat: Coary.

A3. *Auchenipterus brachyurus* (Cope), E. & E., 298.
Habitat: Peru.

4. *Auchenipterus nigripinnis* (Boulenger), Boul., 1898, 280.
Habitat: Paraguay.

### TETRANEMATICHTHYS Bleeker.

Type: *Ageneiosus quadrifilis* Kner.
Range that of the single species.

A1. *Tetranematichthys quadrifilis* (Kner), E. & E., 298.
Habitat: Rio Guaporé.

## Subfamily AGENEIOSINÆ.

### AGENEIOSUS Lacépède.

Type: *Ageneiosus armatus* Lacépède.
*Ceratorhynchus* Agassiz; *Hypophthalmus* Schomburgk; *Davalla* Bleeker; *Ageniosus* Günther.
Range: La Plata and its tributaries; Paranahyba northward to Guiana and westward to Peru.

1. *Ageneiosus inermis* (Linnæus), E. & E., 290.
Habitat: Surinam.

### (AGENEIOSUS Lacépède.)

A2. *Ageneiosus brevis* Steindachner, E. & E., 301.
Habitat: Solimoens; Coary.

3. *Ageneiosus atronasus* Eigenmann & Eigenmann, ..........E. & E., 302.
Habitat: Brazil ?.

4. *Ageneiosus valenciennesi* Bleeker, E. & E., 304.
Habitat: La Plata to Rio Puty.

5. *Ageneiosus armatus* Lacépède, E. & E., 305.
Habitat: Surinam.

A6. *Ageneiosus ucayalensis* Castelnau, E. & E., 306.
Habitat: Para; Ucayale.

7. *Ageneiosus caucanus* Steindachner, E. & E., 306.
Habitat: Cauca.

A8. *Ageneiosus dentatus* Kner, E. & E., 307.
*Ageneiosus pardalis* Lütken.
Habitat: Amazon; Solimoens north to Guiana and Rio Magdalena.

9. *Ageneiosus porphyreus* Cope, E. & E., 309.
Habitat: Surinam.

A10. *Ageneiosus dawalla* (Schomburgk), E. & E., 309.
*Ageneiosus inermis* Cuvier & Valenciennes, *non* Bloch; *Ageneiosus sebæ* Günther.
Habitat: Amazon; Guiana.

### (PSEUDAGENEIOSUS Bleeker.)

(Type: *Ageneiosus brevifilis* Cuvier & Valenciennes.)

A11. *Ageneiosus brevifilis* Cuvier & Valenciennes, ............E. & E., 309.
Habitat: Amazons; Guiana; Upper Paraguay.

12. *Ageneiosus axillaris* Günther, E. & E., 311.
Habitat: Surinam.

## Family HYPOPHTHALMIDÆ.

### HELOGENES Günther.[1]

Type: *Helogenes marmoratus* Günther.

Range that of the single species.

1. *Helogenes marmoratus* Günther, E. & E., 313.

Habitat: Essequibo.

### HYPOPHTHALMUS Spix.

Type: *Hypophthalmus edentatus* Spix.

*Notophthalmus* Hyrtl; *Pseudohypophthalmus* Bleeker.

A1. *Hypophthalmus edentatus* Spix, E. & E., 313.

*Hypophthalmus marginatus, longifilis* and *spixii* Cuvier & Valenciennes; *H. edentulus* Castelnau; *H. fimbriatus* Kner; *H. perporosus* Cope.

Habitat: Amazons and tributaries, and northward.

## Family PYGIDIIDÆ.

### Subfamily CETOPSINÆ.

### HEMICETOPSIS Agassiz.

Type: *Silurus candiru* Spix.

Range: A narrow area from Para to Ecuador.

A1. *Hemicetopsis candiru* (Spix), E. & E., 319.

Habitat: Rio Cupai to Rio Huallaga.

A2. *Hemicetopsis plumbeus* Steindachner, E. & E., 320.

Habitat: Canelos.

### CETOPSIS Agassiz.

Type: *Silurus cæcutiens* Lichtenstein.

Range that of the single species.

A1. *Cetopsis cæcutiens* (Lichtenstein), E. & E., 320.

Habitat: Amazon from Gurupa to Rio Cupai; Orinoco; Irisanga.

### PSEUDOCETOPSIS Bleeker.

Type: *Cetopsis gobioides* Kner.

Range: Irisanga, Marañon.

1. *Pseudocetopsis gobioides* (Kner), E. & E., 322.

Habitat: Irisanga.

A2. *Pseudocetopsis ventralis* (Gill), E. & E., 322.

Habitat: Marañon.

A3. *Pseudocetopsis macroteronema* (Boulenger), ........Boulenger, 1898, 8.

Habitat: Rio Zamora, eastern Ecuador.

### CETOPSOGITON Eigenmann & Bean.

Type: *Cetopsis occidentalis* Steindachner.

1. **Cetopsogiton occidentalis** (Steindachner), .............E. & E., 322.

Habitat: Guayaquil.

### Subfamily PYGIDIINÆ.

### NEMATOGENYS Girard.

Type: *Trichomycterus inermis* Guichenot.

Range that of the single species.

**Nematogenys inermis** (Guichenot), E. & E., 323.

*Nematogenys nigricans* and *pallidus* Philippi.

Habitat: Central Chili.

### PARIOLIUS Cope.

Type: *Pariolius armillatus* Cope.

Range that of the single species.

A1. *Pariolius armillatus* Cope, E. & E., 324.

Habitat: Ambyiacu.

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[1] This genus is a member of a new family.

### HATCHERIA Eigenmann.

Type: *Hatcheria patagoniensis* Eigenmann.

1. *Hatcheria patagoniensis* Eigenmann.

Habitat: Patagonia.

2. *Hatcheria macræi* (Girard), E. & E., 328.

Habitat: Uspullata.

3. **Hatcheria maculata** (Cuvier & Valenciennes), ..........E. & E., 329.

Habitat: Western slopes of central Chili.

4. **Hatcheria areolata** (Cuvier & Valenciennes), ............E. & E., 330.

Habitat: Western slopes of central Chili.

### PYGIDIUM Meyen.

Type: *Pygidium fuscum* Meyen.

Range: Andes from Venezuela and Colombia to Patagonia; southeastern Brazil and central Argentina; Guianas.

1. *Pygidium minutum* (Boulenger), Proc. Zool. Soc., 1891, 235.

Habitat: San Lorenzo district, Rio Grande do Sul.

A2. *Pygidium fuscum* Meyen, E. & E., 325.

Habitat: Peru.

3. **Pygidium palleum** (Philippi), E. & E., 325.

Habitat: Chili.

4. **Pygidium marmoratum** (Philippi), E. & E., 326.

Habitat: Chili.

5. *Pygidium tenue* (Weyenbergh), E. & E., 326.

Habitat: Sierra de Cordoba near Cruz-de-eje.

6. *Pygidium corduvense* (Weyenbergh), E. & E., 326.

Habitat: Rio Primero, Argentina; Bolivian Chaco.

7. **Pygidium tigrinum** (Philippi), E. & E., 326.

Habitat: Chili.

A8. *Pygidium rivulatum* (Cuvier & Valenciennes), ............E. & E., 330.

*Trichomycterus incæ, gracilis, barbatula* Cuvier & Valenciennes; *T. pentlandi, pictus* Castlenau.

Habitat: Titicaca; Ucayale and tributaries.

9. *Pygidium brasiliense* (Reinhardt),[1] E. & E., 332.

Habitat: Rio Grande do Sul to Rio San Francisco and Paraguay.

10. **Pygidium poeyanum** (Cope), E. & E., 326.

Habitat: Western slopes of southern Peru.

11. *Pygidium meridæ* Regan, Regan, 1903.

Habitat: Merida and Rio Albireggas near Merida, Venezuela.

12. **Pygidium tænia** (Kner), E. & E., 333.

Habitat: Western slopes of Peruvian Andes; Rio Zamora; ? French Guiana.

13. **Pygidium laticeps** (Kner), E. & E., 334.

Habitat: Western slopes of Peruvian Andes.

A14. *Pygidium oroyæ* Eigenmann & Eigenmann, ..............E. & E., 334.

Habitat: Oroya River.

15. *Pygidium schmidti* Berg, .......1897.

Habitat: Rio de Belén, Province of Catamarca, Argentina.

19. *Pygidium spegazzinii* Berg, ....1897.

Habitat: Rio de Cachi, Province Salta, Argentina.

17. *Pygidium riojanum* Berg, ......1897.

Habitat: Cordillera de la Rioja, Argentina.

A18. *Pygidium punctatissimum* (Castelnau), ..............E. & E., 334.

Habitat: Araguay.

A19. *Pygidium knerii* (Steindachner), E. & E., 335.

Habitat: Eastern slopes of Ecuador; Rio Zamora.

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[1] Add. *Pygidium brasiliense itatiagæ* Ribeiro, 1906, 15.

A20. *Pygidium eigenmanni* (Boulenger), Boll. Mus. Torino, XIII.
*Pygidium knerii* Eigenmann & Eigenmann, *non* Steindachner.
Habitat: Cumbaca.

A21. *Pygidium vittatum* (Regan), Regan, 1903.
Habitat: Marcapata Valley, Eastern Peru.

A22. **Pygidium dispar** (Tschudi), E. & E., 335.
Habitat: Eastern and western slopes of Ecuador.

23. **Pygidium punctulatum** (Cuvier & Valenciennes), ......E. & E., 336.
Habitat: Western slopes of Peruvian Andes.

24. *Pygidium burmeisteri* Berg, ....1895.
Habitat: Mendoza, Argentina.

25. *Pygidium goeldii* (Boulenger), Boul., 1896.
Habitat: Rio de Janeiro.

26. *Pygidium retropinnis* (Regan), Regan, 1903.
Habitat: St. Augustine, Andes of Colombia, 5,000 feet.

27. *Pygidium nigromaculatum* (Boulenger), .............. E. & E., 336.
Habitat: Colombia.

28. **Pygidium pardus** (Cope), E. & E., 337.
Habitat: Jequetepeque; Callao Bay.

A29. *Pygidium immaculatum* Eigenmann & Eigenmann, ........E. & E., 337.
Habitat: Juiz de Fora; São Matheos; Goyaz.

A30. *Pygidium taczanowskii* (Steindachner), ..............E. & E., 338.
Habitat: Rio de Huambo; Rio de Tortora.

31. *Pygidium nigricans* (Cuvier & Valenciennes), ..........E. & E., 338.
Habitat: Santa Catharina.

A32. *Pygidium amazonicum* (Steindachner), ..............E. & E., 338.
Habitat: Cudajàs.

33. *Pygidium borellii* (Boulenger).
Habitat: Bolivian Chaco; Salta Argentina.

34. **Pygidium quechuorum** Steindachner, St., 1902, 49.
Habitat: Arequiba, Peru.

35. *Pygidium proops* Ribeiro, Ribeiro, 1908.
Habitat: Rio Ribeira.

36. *Pygidium guianensis* Eigenmann, E., 1909, 11.
Habitat: Potaro River, British Guiana.

37. *Pygidium barbouri* Eigenmann MS.
Habitat: Rio Beni.

### EREMOPHILUS Humboldt.

*Thricomycterus* Humboldt; *Trachypoma* Giebel.
Type: *Eremophilus mutisii* Humboldt.
Range that of the single species.

1. *Eremophilus mutisii* Humboldt, E. & E., 274.
*Trachypoma marmoratum* Giebel.
Habitat: Bogota.

### TRIDENS Eigenmann & Eigenmann.

Type: *Tridens melanops* Eigenmann & Eigenmann.
Range: Upper Amazons.

A1. *Tridens melanops* Eigenmann & Eigenmann.
Habitat: Iça.

A2. *Tridens brevis* Eigenmann & Eigenmann.
Habitat: Tabatinga.

### PSEUDOSTEGOPHILUS Eigenmann & Eigenmann.

Type: *Stegophilus nemurus* Günther.
Range that of the single species.

A1. *Pseudostegophilus nemurus* (Günther), E. & E., 341.

### HENONEMUS Eigenmann & Ward.

Type: *Stegophilus intermedius* E. & E.

Range: Rio de La Plata; Amazons.

1. *Henonemus maculatus* (Steindachner), E. & E., 343.
Habitat: Rio de La Plata.

A2. *Henonemus punctatus* (Boulenger), E. & E., 343.
Habitat: Eastern Ecuador.

A3. *Henonemus intermedius* (Eigenmann & Eigenmann), ....E. & E., 343.
Habitat: Goyaz.

A4. *Henonemus macrops* (Steindachner), E. & E., 344.
Habitat: Lake Manacapuru.

### HOMODIÆTUS Eigenmann & Ward.

Type: *Homodiœtus anisitsi* Eigenmann & Ward.

Range that of the single species.

1. *Homodiœtus anisitsi* Eigenmann & Ward, ..........E., 1907*c*, 117.
Habitat: Villa Rica, Paraguay.

### STEGOPHILUS Reinhardt.

Type: *Stegophilus insidiosus* Reinhardt.

Range: Rio das Velhas; Solimoens.

1. *Stegophilus insidiosus* Reinhardt, E. & E., 344.
Habitat: Rio das Velhas.

A2. *Stegophilus reinhardtii* Steindachner, E. & E., 344.
Habitat: Solimoens and tributaries.

### MIUROGLANIS Eigenmann & Eigenmann.

Type: *Miuroglanis platycephalus* Eigenmann & Eigenmann.

Range that of the single species.

A1. *Miuroglanis platycephalus* Eigenmann & Eigenmann, ......E. & E., 346.
Habitat: Jutahy.

### ACANTHOPOMA Lütken.

Type: *Acanthopoma annectens* Lütken.

Range that of the single species.

1. *Acanthopoma annectens* Lütken, L., 1892.
Habitat: Brazil.

### VANDELLIA Cuvier & Valenciennes.

Type: *Vandellia cirrhosa* Cuvier & Valenciennes.

Range: Solimoens and Marañon and tributaries.

A1. *Vandellia cirrhosa* Cuvier & Valenciennes, ............E. & E., 345.
Habitat: Hyauary.

A2. *Vandellia plazaii* Castelnau, E. & E., 345.
Habitat: Ucayale; Calderon; Lake Hyanuary.

### PAREIODON Kner.

*Centrophorus* Kner; *Asteromycterus* Guichenot.

Type: *Pareiodon microps* Kner.

Range that of the single species.

A1. *Pareiodon microps* Kner, E. & E., 346.
*Trichomycterus pusillus* Castelnau.
Habitat: Amazon and tributaries.

## Family CALLICHTHYIDÆ.

### SCLEROMYSTAX Günther.

Type: *Callichthys barbatus* Quoy & Gaimard.

Range that of the single species.

1. *Scleromystax barbatus* (Quoy & Gaimard), ............ E. & E., 451.
Habitat: Rio Janeiro.

### CALLICHTHYS Linnæus.

Type: *Callichthys asper* Quoy & Gaimard.

Range: La Plata to Trinidad.

A1. *Callichthys callichthys* Linnæus,[1] E. & E., 452.

*Callichthys tamoata* Linnæus; *C. asper* Quoy & Gaimard; *Cataphractus depressus* Swainson; *Callichthys cœlatus* Cuvier & Valenciennes; *C. læviceps* Cuvier & Valenciennes; *C. loricatus* Gronow; *C. kneri* Gill; *C. affinis* Günther; *C. hemiphractus* Hensel.

Habitat: La Plata to Trinidad.

2. *Callichthys arcifer* Hensel, E. & E., 455.

Habitat: Rio de Janeiro.

### HOPLOSTERNUM Gill.

Type: *Callichthys lævigatus* Valenciennes.

Range: La Plata to Trinidad.

A1. *Hoplosternum littorale* (Hancock), E. & E., 456.

*Callichthys subulatus* Cuvier & Valenciennes; *C. lævigatus* Valenciennes; *C. albidus* Cuvier & Valenciennes; *Hoplosternum stewardii* Gill.

Habitat: La Plata to Trinidad.

A2. *Hoplosternum thoracatum* (Cuvier & Valenciennes), ......E. & E., 458.

*Callichthys longifilis* Cuvier & Valenciennes; *C. personatus* Ranzani; *C. exaratus* and *pictus* Müller & Troschel; *C. sulcatus* Kner; *C. chiquitos* Castelnau.

Habitat: Amazons and northward; Paraguay.

A3. *Hoplosternum melampterum* (Cope).

*Hoplosternum pectoralis* Boulenger.

Habitat: Ambyiacu.

### DECAPOGON Eigenmann & Eigenmann.

Type: *Callichthys adspersus* Steindachner.

Range that of the single species.

A1. *Decapogon adspersum* (Steindachner), E. & E., 461.

Habitat: Porto do Moz; Cudajas; Tabatinga.

### DIANEMA Cope.

Type: *Dianema longibarbis* Cope.

Range that of the single species.

A1. *Dianema longibarbis* Cope, E. & E., 463.

Habitat: Ambyiacu.

### CHÆNOTHORAX Cope.

Type: *Chænothorax bicarinatus* Cope.

Range: Marañon and tributary.

1. *Chænothorax taiosh* (Castelnau), E. & E., 464.

Habitat: ?

A2. *Chænothorax bicarinatus* Cope, E. & E., 464.

Habitat: Marañon.

A3. *Chænothorax semiscutatus* Cope, E. & E., 464.

Habitat: Ambyiacu.

### BROCHIS Cope.

Type: *Brochis cœruleus* Cope.

Range: Marañon and tributaries.

A1. *Brochis dipterus* Cope, ..E. & E., 464.

Habitat: Ambyiacu.

A2. *Brochis cœruleus* Cope, ..E. & E., 464.

Habitat: Ambyiacu.

### ASPIDORAS von Ihering.

Type: *Aspidoras rochai* v. Ihering.

Range that of the single species.

1. *Aspidoras rochai* v. Ihering, v. I., 1907, 30.

Habitat: Fortaleza, Ceará.

### CORYDORAS Lacépède.

*Hoplisoma* Swainson; *Hoplosoma* Gill; *Gasterodermis* Cope.

Type: *Corydoras geoffroy* Lacépède.

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[1] Several varieties of this species may be recognizable. Regan considers *kneri* from Trinidad a distinct species.

Range: La Plata to Guiana.

A1. *Corydoras elegans* Steindachner, E. & E., 466.
Habitat: Cudajas; Teffé.

2. *Corydoras nattereri* Steindachner, E. & E., 470.
Habitat: Rio Janeiro to Rio Doce.

3. *Corydoras juquiaœ* v. Ihering, v. I., 1907, 37.
Habitat: Rio Juquia, Poço Grande, São Paulo.

4. *Corydoras œneus* (Gill), . . E. & E., 471.
Habitat: Trinidad.

A5. *Corydoras armatus* (Günther), E. & E., 471.
Habitat: Marañon and tributaries.

6. *Corydoras paleatus* (Jenyns), E. & E., 471.
*Corydoras marmoratus* Steindachner; *Callichthys punctatus* Cuvier & Valenciennes.
Habitat: La Plata and tributaries.

A7. *Corydoras punctatus* (Bloch), E. & E., 472.
*Corydoras geoffroy* Lacépède; *Corydoras ambiacus* Cope.
Habitat: Guiana; Solimoens; Marañon.

8. *Corydoras eigenmanni* v. Ihering, v. I., 1907, 34.
Habitat: Cubatao and Raiz da Serra, São Paulo.

9. *Corydoras trilineatus* Cope, E. & E., 473.
*Corydoras agassizii* Steindachner.
Habitat: Ambyiacu.

A10. *Corydoras acutus* Cope, E. & E., 474.
Habitat: Ambyiacu.

11. *Corydoras amphibelus* Cope, E. & E., 474.
Habitat: Ambyiacu.

A12. *Corydoras hastatus* Eigenmann & Eigenmann, . . . . . . . . . . E. & E., 474.
Habitat: Villa Bella.

13. *Corydoras australis* Eigenmann & Ward, . . . . . . . . . . . . E., 1907*c*, 123.
Habitat: Paraguay.

14. *Corydoras microps* Eigenmann & Kennedy, . . . . . . . . . . . . . . . . . . . . . 1903.
Habitat: Paraguay.

15. *Corydoras raimundi* Steindachner, St., 1906, 84.
Habitat: Parnahyba.

16. *Corydoras aurofrenatus* Eigenmann & Kennedy, . . . . . . . . . . E. & K., 1903.
Habitat: Paraguay.

17. *Corydoras treitlii* Steindachner, St., 1906.
Habitat: Parnahyba.

18. *Corydoras julii* Steindachner, St., 1906.
Habitat: Parahim and Parnahyba.

### OSTEOGASTER Cope.

Type: *Corydoras eques* Steindachner.
Range: Amazons.

A1. *Osteogaster eques* (Steindachner), E. & E., 466.
Habitat: Solimoens.

2. *Osteogaster splendens* (Castelnau), E. & E., 468.
Habitat: Tocantins.

## Family LORICARIIDÆ.[1]

### PLECOSTOMUS Gronow.

Type: *Loricaria plecostomus* Linnæus.
Range: La Plata to western Ecuador and Colombia.

A1. *Plecostomus plecostomus* (Linnæus), Regan, 205.
*Hypostomus guacari* Lacépède; *Loricaria flora* Shaw; *Plecostomus bicir-*

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[1] The Loricariidæ, a family of South American *Nematognathi*, have recently been monographed by Regan (Transactions of the Zoological Society of London, vol. 17, pp. 191–326, 1904). The genera have been liberally lumped in this volume, and it is my opinion that for biological discussion, to show the natural

*rhosus* Gronow; *Hypostomus robinii* Gill; *Plecostomus brasiliensis* Bleeker; *Plecostomus seminudus* Eigenmann & Eigenmann; *Plecostomus boulengeri* Eigenmann & Kennedy.

Habitat: La Plata north to Trinidad; not in southeastern Brazil.

2. *Plecostomus commersonii* (Cuvier & Valenciennes), ..........Regan, 206.

*Plecostomus spiniger* Hensel; *Plecostomus limosus* Eigenmann & Eigenmann; *? Plecostomus aspilogaster,* Cope.

Habitat: La Plata Basin, including Rio Grande do Sul; eastern Brazil.

3. *Plecostomus punctatus* (Cuvier & Valenciennes), ...........Regan, 207.

*Hypostomus subcarinatus* Castelnau;

relationships, and for the purpose of discussing the geographical distribution, it will be better to recognize a larger number of genera. My estimate of the character of these can best be expressed by the following key, in which I have followed to a very large extent the phraseology of Regan, but in which are recognized a larger number of genera than are admitted by him. The list of species is accepted with but slight modifications from Regan.

SUBFAMILIES OF LORICARIIDÆ.

*a.* Hæmal spines all simple; lower and fourth upper pharyngeals not toothed; anterior rudimentary ray of ventral normally shaped, but internal and directed forwards, upper part of the body protected by bony scutes.
  *b.* Lower transverse portion of clavicles and coracoids not exposed; margin of snout naked or covered with small granular plates.
  PLECOSTOMINÆ.
  *bb.* Lower transverse portion of clavicles and coracoids exposed; margin of snout composed of more or less firm plates. HYPOPTOPOMATINÆ.
*aa.* Hæmal spines of the vertebræ above the anal fin bifid; lower and fourth upper pharyngeals toothed.
  *c.* No anterior rudimentary ray of ventral; caudal peduncle elongate and strongly depressed; upper part of body with bony scutes.
  LORICARIINÆ.
  *cc.* Anterior rudimentary ray of ventral internal, plate-like; caudal peduncle cylindrical or compressed.
    *d.* Upper part of body with bony scutes; abdomen with a large, regular, nearly square patch of small granular plates, naked at the sides and anteriorly and posteriorly.
    NEOPLECOSTOMINÆ.

PLECOSTOMINÆ.

*a.* First scute of lower lateral series posterior to the temporal plate, with which the second is not in contact.
  *b.* Premaxillaries nearly equal in length to the dentaries, and with about the same number of teeth.
    *c.* Operculum and interoperculum little, and not independently movable.
      *d.* Snout granular to its margin.
        *e.* Adipose fin present.
          *f.* Operculum and interoperculum not margined with bristles.
            *g.* Body covered with plates.
            1. *Plecostomus* Gronow.
            *gg.* Body naked.
            2. *Lithogenes* Eigenmann.
          *ff.* Operculum and interoperculum with well-developed marginal bristles.
          3. *Pogonopoma* Regan. (Type, *Plecostomus wertheimeri* Steind.)
        *ee.* Adipose fin absent.
          *h.* Operculum and interoperculum with well-developed marginal bristles.
          4. *Canthopomus* Eigenmann nov.
          *hh.* Operculum and interoperculum not margined with bristles.
          5. *Rhinelepis* Spix.
          *hhh.* Adipose replaced by a low median crest. No externally visible occipital crest.
          6. *Corymbophanes* Eigenmann.
      *dd.* Snout with a naked margin.
      7. *Hemipsilichthys* Eigenmann & Eigenmann.
    *cc.* Interoperculum more or less freely movable, usually spinate or bristly.
      *i.* Snout granular to its margin.
        *j.* Teeth numerous, bifid.
          *k.* Interoperculum usually armed with slender spines with hooked apices which can be everted and completely retracted beneath the operculum.
            *l.* Sides of head without bristles.
              *m.* Last dorsal ray connected with the scute by an inconspicuous membrane at its base.
                *n.* Dorsal with I, 7 or I, 8 rays.
                8. *Hemiancistrus* Bleeker.
                *nn.* Dorsal with I, 10 or I, 13 rays.
                9. *Pterygoplichthys* Gill.
              *mm.* Last dorsal ray attached by

*Plecostomus punctatus* Günther; *Plecostomus officinis* Steindachner; *Plecostomus commersoni, affinis* and *scabriceps* Eigenmann & Eigenmann.
Habitat: Southeastern Brazil.

4. **Plecostomus spinosissimus** Steindachner, ................Regan, 208.
Habitat: Guayaquil, Pacific slope of Ecuador.

well developed membrane either to the 3 or 4 scales following it; or to the spine of the adipose fin. D. I, 7.
10. *Parancistrus* Bleeker.

*ll.* Sides of head with slender bristles. D. I, 7. Last dorsal ray attached to the scute following it by an inconspicuous membrane at its base.
11. *Lasiancistrus* Regan.

*kk.* Interoperculum armed with slender spines which cannot be completely retracted beneath the operculum, or with permanently everted bristles, sides of head with bristles which are always longer in the male than in the female, and may be wanting in the latter; last dorsal ray connected by a membrane with one or two scutes following it; abdomen completely naked.

*o.* D. I, 7 or I, 8.
12. *Pseudancistrus* Bleeker.

*oo.* D. I, 9 or I, 10.
13. *Delturus* Eigenmann & Eigenmann.

*jj.* Teeth few, spoon-shaped.

*p.* Interoperculum without evertible spines. 14. *Cochliodon* Heckel.

*pp.* Interoperculum with some slender, evertible spines.
15. *Panaque* Eigenmann.

*ii.* Snout with naked margin.

*q.* Mouth wide, the length of mandibular ramus nearly equal to the interorbital width; naked margin of snout not very wide, without tentacles.
16. *Chætostomus* Tschudi.

*qq.* Mouth moderate or narrow, the length of mandibular ramus considerably less than the interorbital width.

*r.* Snout with a broad, naked margin, without tentacles.
17. *Xenocara* Regan. (Type, the first species, *X. latifrons* Günther.)

*rr.* Snout with tentacles, the naked margin broad in males, narrow in females. 18. *Ancistrus* Kner.

*bb.* Premaxillaries much shorter than the dentaries and with fewer teeth.

*s.* Premaxillaries united; body not greatly depressed. 19. *Pseudacanthicus* Bleeker.

*ss.* Premaxillaries not united; body much depressed. 20. *Lithoxus* Eigenmann.

*aa.* First two scutes of the lower lateral series below the temporal plate and in contact with it above.
21. *Acanthicus* Spix.

HYPOPTOPOMINÆ.

*a.* Temporal plates imperforate.

*b.* An adipose dorsal fin. 22. *Hypoptopoma* Günther.

*bb.* No adipose fin.
23. *Oxyropsis* Eigenmann & Eigenmann.

*aa.* Temporal plates perforated like a sieve.

*c.* Abdomen covered with three longitudinal series of plates.

*d.* An adipose dorsal fin.
24. *Parotocinclus* Eigenmann & Eigenmann.

*dd.* No. adipose dorsal fin. 25. *Otocinclus* Cope.

*cc.* Abdomen naked or covered with numerous small plates, irregularly arranged.
26. *Microlepidogaster* Eigenmann & Eigenmann.

LORICARIINÆ.

*a.* Teeth in the jaws in small or moderate number, not setiform; a more or less distinct orbital notch.

*b.* Snout rounded or pointed, not, or not much produced. 27. *Loricaria* Linnæus.

*bb.* Snout produced, with a long rostrum.

*c.* Snout expanded at tip.
28. *Hemiodontichthys* Bleeker.

*cc.* Snout pointed, not expanded at tip.
29. *Reganella* Eigenmann.

*aa.* Teeth in the jaws numerous, setiform; orbit circular, without distinct notch.

*d.* Dorsal opposite to the ventrals.

*e.* Snout rounded or pointed, not produced as a rostrum; lateral keels obsolete.
30. *Harttia* Steindachner.

*ee.* Snout produced, forming a distinct rostrum; sides of the head in the male margined with bristles. 31. *Sturisoma* Swainson.

*dd.* Dorsal opposite to the anal; snout very long, body very slender.
32. *Farlowella* Eigenmann & Eigenmann.

NEOPLECOSTOMINÆ.

*a.* Elongate; upper part of body enclosed in bony scutes; eyes small, teeth bifid, in a single series; an adipose fin.
33. *Neoplecostomus* Eigenmann & Eigenmann.

5. **Plecostomus festæ** Boulenger, Regan, 208.
Habitat: Pacific slope of Ecuador.

A6. *Plecostomus verres* (Cuvier & Valenciennes), ............Regan, 209.
*Hypostomus plecostomus* C. & V., *non* L.?; *Hypostomus pantherinus* Kner; *Plecostomus bicirrhosus* (part) Günther.
Habitat: Venezuela; Guiana; Marajo Island.

A7. *Plecostomus carinatus* Steindachner, Regan, 209.
Habitat: Amazon.

8. *Plecostomus tietensis* v. Ihering, v. Ihering, 1907, 559.
Habitat: Rio Tiete, São Paulo, Brazil.

9. *Plecostomus vaillanti* Steindachner, Regan, 210.
Habitat: Paraguay, Rio Preto; Rio Puty; San Gonçallo.

10. *Plecostomus laplatæ* Eigenmann, E., 1907.
Habitat: La Plata.

A11. *Plecostomus emarginatus* (Cuvier & Valenciennes), ........Regan, 210.
*Hypostomus squalium* Schomburgk; *Plecostomus scopularius, biseriatus, virescens* Cope; *Plecostomus villarsi* Lütken; *Pl. annæ* Steindachner.
Habitat: Amazons to Orinoco.

12. *Plecostomus tenuicauda* Steindachner, Steindachner, 1878, 40.
Habitat: Magdalena and tributaries.

A13. *Plecostomus alatus* (Castelnau), Regan, 211.
*Plecostomus francisci* Lütken.
Habitat: Araguay and San Francisco.

14. *Plecostomus regani* v. Ihering, 558.
Habitat: Rio Piracicaba, São Paulo, Brazil.

15. *Plecostomus cordovæ* Günther, Regan, 212.
Habitat: Cordova.

16. *Plecostomus borellii* Boulenger, Regan 212.
Habitat: Bolivia.

17. *Plecostomus paulinus* v. Ihering, v. I., 1907, 560.
Habitat: Piracicaba, São Paulo, Brazil.

A18. *Plecostomus latirostris* Regan, Regan, 213.
*Plecostomus pantherinus* Boulenger, *non* Kner.
Habitat: Goyas and Rio Jungada, Matto Grosso.

19. *Plecostomus ternetzi* Boulenger, Regan, 213.
Habitat: Paraguay.

20. *Plecostomus macrops* Eigenmann & Eigenmann, ............Regan, 214.
Habitat: Rio das Velhas.

21. *Plecostomus hermanni* v. Ihering, v. I., 1907, 560.
Habitat: Rio Piracicaba, São Paulo, Brazil.

22. *Plecostomus garmani* Regan, Regan, 214.
*Plecostomus lima* Eigenmann & Eigenmann, *non* Lütken.
Habitat: Rio San Francisco; Rio das Velhas; Rio Grande do Sul.

A23. *Plecostomus atropinnis* Eigenmann & Eigenmann, ........Regan, 215.
Habitat: Goyaz.[1]

24. *Plecostomus robinii* Cuvier & Valenciennes, .............Regan, 215.
Habitat: Montevideo; Trinidad.

25. *Plecostomus unæ* Steindachner, Regan, 215.
*Plecostomus robinii* Günther and Eigenmann & Eigenmann, *non* C. & V.
Habitat: Bahia.

26. *Plecostomus wuchereri* Günther, Regan, 216.
*Plecostomus brevicauda* Günther; *Pl.*

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[1] If, as Regan thinks, this species or variety is identical with *garmani* the species should of course go by the older name *atropinnis*.

*lima* Lütken; *Pl. vermicularis* Eigenmann & Eigenmann.
Habitat: Bahia and Rio San Francisco, Paraguay.

27. *Plecostomus lütkeni* Steindachner, Regan, 217.
*Plecostomus lima* Steindachner, *non* Lütken.
Habitat: Southeastern Brazil.

28. *Plecostomus auroguttatus* (Kner), Regan, 217.
*Hypostomus asperatus* Castelnau, *Plecostomus johnii* Steindachner.
Habitat: Southeastern Brazil.

29. *Plecostomus obtusirostris* Steindachner, St., 1907*a*, 490.
Habitat: Cubatao.

A30. *Plecostomus unicolor* Steindachner, St., 1908*f*, 164.
Habitat: Rio Purus.

31. *Plecostomus hemiurus* Eigenmann MS.
Habitat: British Guiana.

A32. *Plecostomus horridus* (Kner), Regan, 1908*b*, 795.
Habitat: Rio Guaporé.

33. *Plecostomus iheringii* Regan, Regan, 1908*b*, 795.
Habitat: Piracicaba.

34. *Plecostomus margaretifer* Regan, Regan, 1908*b*, 796.
Habitat: Piracicaba.

35. *Plecostomus strigaticeps* Regan, Regan, 1908*b*, 796.
Habitat: Piracicaba.

36. *Plecostomus albopunctatus* Regan, Regan, 1908*b*, 797.
Habitat: Piracicaba.

A37. *Plecostomus goyazensis* Regan, Regan, 1908*b*, 798.
*Plecostomus latirostris* part Regan.
Habitat: Goyaz.

### POGONOPOMA Regan.

Type: *Plecostomus wertheimeri* Steindachner.
Range that of the single species.

1. *Pogonopoma wertheimeri* (Steindachner), ................ Regan, 218.
Habitat: Santa Clara, southeastern Brazil.

### CANTHOPOMUS Eigenmann, genus novum.

Type: *Rhinelepis genibarbis* Cuvier & Valenciennes.
Range: Amazons.

A1. *Canthopomus pellegrini* (Regan), Regan, 218.
Habitat: Upper Amazon.

A2. *Canthopomus genibarbis* (Cuvier & Valenciennes), .......... Regan, 218.
*Rhinelepis agassizii* Steindachner.
Habitat: Amazon.

### RHINELEPIS Spix.

Type: *Rhinelepis aspera* Spix.
Range: Parahyba; Parana and San Francisco.

1. *Rhinelepis parahybæ* Steindachner, Regan, 219.
Habitat: Rio Parahyba.

2. *Rhinelepis aspera* Spix, .... Regan, 220.
*Rhinelepis strigosa* Cuvier & Valenciennes.
Habitat: Parana and San Francisco.

3. *Rhinelepis microps* v. Ihering, v. I., 1907, 24.
Habitat: Piquete, São Paulo.

### HEMIPSILICHTHYS Eigenmann & Eigenmann.

? *Kronichthys* Ribeiro.
Type: *Xenomystus gobio* Lütken.
Range: Parahyba to Santa Catharina.

1. *Hemipsilichthys gobio* (Lütken), Regan, 221.
*Plecostomus heylandii* Boulenger.
Habitat: Rio Parahyba, Santos.

2. *Hemipsilichthys calmoni* Steindachner, St., 1907, 82.

*? Kronichthys subteres* Ribeiro; *N. duseni, Hemipsilichthys cameroni* St.
Habitat: Santa Catharina.

### HEMIANCISTRUS Bleeker.

Type: *Ancistrus medians* Kner.
Range: Amazons north to Veragua; Para to western Ecuador and Pacific side of Panama.

1. **Hemiancistrus annectens** (Regan), Regan, 225.
Habitat: St. Javier and Rio Durango; northwestern Ecuador.

2. *Hemiancistrus medians* (Kner), Regan, 229.
Habitat: Surinam.

3. **Hemiancistrus aspidolepis** (Günther), Regan 230.
Habitat: Veragua, Pacific slope of Panama.

A4. *Hemiancistrus brachyurus* (Kner), Regan, 231.
*H. pictus* of Kner, Günther and Eigenmann, *non* Castelnau.
Habitat: Rio Negro.

A5. *Hemiancistrus scaphirhynchus* (Kner), Regan, 231.
Habitat: Amazons.

A6. *Hemiancistrus oligospilus* (Günther), Regan, 232.
Habitat: Rio Capin.

A7. *Hemiancistrus vittatus* (Steindachner), Regan, 232.
Habitat: Amazons; Paraguay.

A8. *Hemiancistrus bachii* (Boulenger), Regan, 233.
Habitat: Rio Jurua.

9. *Hemiancistrus schomburgki* (Günther), Regan, 233.
Habitat: British Guiana.

10. *Hemiancistrus bovallii* Regan, Regan, 1906, 96.
Habitat: Upper Potaro, British Guiana.

11. *Hemiancistrus megacephalus* (Günther), ............... Regan, 234.
*? Hypostomus itacua* Cuvier & Valenciennes; *Chætostomus macrops* Lütken.
Habitat: Guiana.

A12. *Hemiancistrus platycephalus* (Boulenger), .............. Regan, 235.
Habitat: Eastern Ecuador.

### PTERYGOPLICHTHYS Gill.

Type: *Hypostomus duodecimalis* Cuvier & Valenciennes.
Range: Paraguay to Magdalena.

1. *Pterygoplichthys undecimalis* (Steindachner), ............ Regan, 226.
Habitat: Rio Magdalena.

2. *Pterygoplichthys etentaculatus* (Spix), Regan, 226.
*Hypostomus duodecimalis* Cuvier & Valenciennes; *Ancistrus longimanus* Kner.
Habitat: Rio San Francisco.

A3. *Pterygoplichthys gibbiceps* (Kner), Regan, 227.
*Liposarcus altipinnis* Günther; *Liposarcus scrophus* Cope.
Habitat: Amazons from Gurupa to Nauta.

A4. *Pterygoplichthys lituratus* (Kner), Regan, 227.
Habitat: Eastern Brazil; Rio Guaporé and Amazons.

A5. *Pterygoplichthys multiradiatus* (Hancock), .............. Regan, 228.
*Hypostomus pardalis* Castelnau; *Liposarcus varius, Liposarcus jeanesianus* Cope.
Habitat: Amazons and Guiana; Paraguay.

6. *Pterygoplichthys anisitsi* Eigenmann & Kennedy, ............ Regan, 229.
*Ancistrus multiradiatus alternans* Regan.
Habitat: Paraguay and southern Bolivia.

A7. *Pterygoplichthys punctatus* Günther, Regan, 229.
*Ancistrus duodecimalis* Kner, *non* Cuvier & Valenciennes.
Habitat: Amazons; Venezuela.

8. *Pterygoplichthys juvens* Eigenmann & Kennedy, ..........E. & K., 1903.
Habitat: Paraguay. Probably young of *anisitsi*.

9. *Pterygoplichthys gigas* (Boulenger), Regan, 230.
Habitat: Paraguay.

### PARANCISTRUS Bleeker.

Type: *Hypostomus aurantiacus* Castelnau.
Range: Amazon Basin.

A1. *Parancistrus niveatus* (Castelnau), Regan, 235.
*Hemiancistrus longipinnis* Kindle.
Habitat: Araguay; Tocantins.

A2. *Parancistrus punctatissimus* (Steindachner), ............Regan, 236.
Habitat: Amazon.

A3. *Parancistrus aurantiacus* (Castelnau), Regan, 236.
*Hypostomus nigricans* Castelnau; *Hypostomus vicinus* Castelnau.
Habitat: Peruvian Amazon.

### LASIANCISTRUS Regan.

Type: *Chætostomus heteracanthus* Günther.
Range: Peruvian Amazon and Venezuela.

A1. *Lasiancistrus heteracanthus* (Günther), ...............Regan, 237.
Habitat: Peruvian Amazon.

A2. *Lasiancistrus pictus* (Castelnau), Regan, 237.
Habitat: Ucayale.

3. *Lasiancistrus mystacinus* (Kner), Regan, 238.
Habitat: Caracas.

4. *Lasiancistrus guacharote* (Cuvier & Valenciennes), ..........Regan, 238.
*? Chætostomus trinitatis* Günther.
Habitat: Said to be Porto Rico.

### PSEUDANCISTRUS Bleeker.

Type: *Hypostomus barbatus* Cuvier & Valenciennes.
Range: Colombia to Guiana.

1. *Pseudancistrus setosus* (Boulenger), Regan, 239.
Habitat: Colombia.

A2. *Pseudancistrus barbatus* (Cuvier & Valenciennes), ..........Regan, 240.
*Hypostomus guttatus* Cuvier & Valenciennes.
Habitat: Guiana; Paraguay.

3. *Pseudancistrus depressus* (Günther), Regan, 240.
Habitat: Surinam.

4. *Pseudancistrus güntheri* (Regan), Regan, 241.
*Plecostomus guttatus* Günther, *non* Cuvier & Valenciennes.
Habitat: British Guiana.

5. *Pseudancistrus nigrescens* Eigenmann MS.
Habitat: Potaro River.

### DELTURUS Eigenmann & Eigenmann.

Type: *Delturus parahybæ* E. & E.
Range: Southeastern Brazil.

1. *Delturus angulicauda* (Steindachner), Regan, 241.
Habitat: Southeastern Brazil.

2. *Delturus parahybæ* Eigenmann & Eigenmann, ...............Regan, 241
Habitat: Rio Parahyba.

### COCHLIODON Heckel.

Type: *Cochliodon hypostomus* Heckel =*Hypostomus cochliodon* Kner.
Range that of the single species.

A1. *Cochliodon cochliodon* (Kner), Regan, 242.

*Cochliodon hypostomus* Heckel; *Loricaria melanoptera* Natterer.
Habitat: Amazon to Paraguay.

PANAQUE Eigenmann & Eigenmann.

Type: *Chætostomus nigrolineatus* Peters.
Range: Goyaz to Xeberos and Magdalena.

A1. *Panaque dentex* (Günther), Regan, 243.
Habitat: Xeberos.

2. *Panaque cochliodon* (Steindachner), Regan, 243.
*Chætostomus gibbosus* Steindachner and *Panaque gibbosus* Regan.
Habitat: Magdalena Basin.

A3. *Panaque nigrolineatus* (Peters), Regan, 244.
Habitat: Goyaz; Venezuela.

CHÆTOSTOMUS Tschudi.

Type: *Chætostomus loborhynchus* Tschudi.
Range: Mountains north of Peru to Panama and Venezuela.

1. **Chætostomus loborhynchus** Tschudi, Regan, 246.
Habitat: Andes of western Peru.

A2. *Chætostomus marcapatæ* Regan, Regan, 246.
Habitat: Marcapata Valley, eastern Peru.

A3. *Chætostomus brevis* Regan, Regan, 246.
Habitat: Rios Bomboiza and Zamora, eastern Peru.

A4. *Chætostomus taczanowskii* Steindachner, ................Regan, 247.
Habitat: Rios Huambo and Tortora, eastern Peru.

A5. **Chætostomus dermorhynchus** Boulenger, ..............Regan, 248.
Habitat: Eastern and western Ecuador.

6. **Chætostomus fischeri** Steindachner, Regan, 248.
Habitat: Rio Mamoni near Chepo.

8. *Chætostomus stanii* Lütken, Regan, 248.
Habitat: Puerto Cabello, Venezuela.

9. *Chætostomus guairensis* Steindachner, Regan, 249.
Habitat: Caracas, Venezuela.

10. **Chætostomus marginatus** Regan, Regan, 249.
*Chæstomus microps* Boulenger, *non* Günther.
Habitat: Salidero, northwest Ecuador.

A11. *Chætostomus branickii* Steindachner, Regan, 250.
Habitat: Callacate, eastern Peru.

12. *Chætostomus anomalus* Regan, Regan, 250.
Habitat: Merida and neighboring mountains, Venezuela.

13. *Chætostomus thomsoni* Regan, Regan, 250.
Habitat: Villeta, Colombia.

14. *Chætostomus nudirostris* Lütken. Regan, 251.
Habitat: Valencia, Venezuela.

15. **Chætostomus microps** Günther, Regan, 251.
*Hypostomus erinaceus* Günther, *non* Cuvier & Valenciennes.
Habitat: Western slope of Ecuador.

XENOCARA Regan.

Type: *Chætostomus latifrons* Günther.
Range: Peru to Guiana.

A1. *Xenocara latifrons* (Günther), Regan, 253.
Habitat: Peruvian Amazon.

A2. *Xenocara gymnorhynchus* (Kner), Regan, 254.
*? Hypostomus nudiceps* Müller & Troschel.
Habitat: Venezuela and Guiana; Paraguay.

### ANCISTRUS Kner.[1]

*Thysanocara* Regan.

Type: *Ancistrus cirrhosus* Kner.

Range: Paraguay to Rio Chagres; Rio Grande do Sul.

A1. *Ancistrus dolichopterus* Kner, Regan 254.

*Ancistrus temminckii* E. & E., *non* Cuvier & Valenciennes.

Habitat: Amazon; Guiana.

2. *Ancistrus temminckii* (Cuvier & Valenciennes), ............Regan, 254.

Habitat: Guiana.

A3. *Ancistrus hoplogenys* (Günther), Regan, 255.

*Chætostomus leucostictus* Günther; *Chætostomus alga, malacops, tectirostris* Cope.

Habitat: Guiana, Amazons and Paraguay.

A4. *Ancistrus cirrhosus* (Cuvier and Valenciennes), ..........Regan, 256.

*Chætostomus variolus* Cope.

Habitat: Trinidad; Guiana; Amazons; Paraguay; Rio Grande do Sul.

*Ancistrus ancistrus dubius* Eigenmann & Eigenmann, ..............E. 446.

Habitat: Amazons.

5. *Ancistrus chagresi* Eigenmann & Eigenmann, ...............Regan, 256.

Habitat: Rio Chagres.

6. *Ancistrus rothschildi* (Regan), Regan, 1905.

Habitat: Puerto Cabello, Venezuela.

A7. *Ancistrus occidentalis* (Regan), Regan, 257.

Habitat: Canelos, eastern Ecuador.

8. *Ancistrus brevipinnis* (Regan), Regan, 257.

Habitat: Rio Grande do Sul; Theresopolis.

A9. *Ancistrus montanus* (Regan), Regan, 258.

Habitat: Eastern Andes of Bolivia.

A10. *Ancistrus bufonius* (Cuvier & Valenciennes), ..........Regan, 258.

*Hypostomus calamita* Cuvier & Valenciennes; *Chætostomus jelskii* Steindachner.

Habitat: Eastern Andes of Peru and Bolivia.

A11. *Ancistrus stigmaticus* Eigenmann & Eigenmann, ..........Regan, 259.

Habitat: Goyaz to San Matheos.

12. *Ancistrus lithurgicus* Eigenmann MS.

Habitat: Crab Falls, Essequibo River.

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[1] Doubtful species of this genus are *Chætostomus sericeus* Cope and *Hypostomus erinaceus* C. & V.

Kner (1853) described the genus *Ancistrus* to include many species, which he divides into the two groups, *Brachypteri,* D. I, 7–I, 9, and *Macropteri,* D. I, 11–I, 13.

Gill (1859) separated the Macropteri under the name *Pterygoplichthys,* saying: "The genus *Ancistrus* seems to have been framed with special regard to those fishes to which the name is here restricted, and is by Dr. Kner divided into two sections, which correspond to *Ancistrus* and *Pterygoplichthys,* his section *a* answering to the former genus and *b* to the latter."

The species known to Kner and included in his Brachypteri are: *Hypostomus cirrhosus* C. & V., *Ancistrus dolichopterus* Kner, *Ancistrus gymnorhynchus* Kner, *Ancistrus mystacinus* Kner, *Ancistrus pictus* Kner, *Ancistrus brachyurus* Kner, *Ancistrus scaphirhynchus* Kner. There can be no mistake as to what Gill meant.

Gill redescribed the genus *Ancistrus,* not to restrict it, but as he described or redescribed all of the other genera of fresh-water fishes from Trinidad.

His description of *Ancistrus* was either drawn from his specimens of *guacharote* or from Cuvier & Valencienne's (XV, 508) description of *guacharote. Guacharote* was known to Kner only through C. & V.'s description and on account "der Ungenauigkeit der Beschreibung", he was unable to place it with certainty. He thought it might be his *mystacinus.*

Regan considers *guacharote* as belonging to his new subgenus *Lasiancistrus.* But because Gill's wording of the description applies only to *brachyurus* and *scaphirhynchus* (and *medians*) of Kner, Regan considers the latter typical of *Ancistrus.* Gill's *diagnosis* based on *guacharote,* a species not known to Kner and at least subgenerically distinct from *brachyurus* and *scaphirhynchus,* can have no bearing whatever on the restriction of *Ancistrus.*

Fortunately Bleeker definitely restricted the name to Kner's first species, *cirrhosus.*

### PSEUDACANTHICUS Bleeker.

Type: *Hypostomus serratus* Cuvier & Valenciennes.
Range: Amazon to Surinam.

1. *Pseudacanthicus serratus* (Cuvier & Valenciennes), ..........Regan, 260.
Habitat: Surinam.

A2. *Pseudacanthicus spinosus* (Castelnau), Regan, 260.
Habitat: Amazon.

3. *Pseudacanthicus fordii* (Günther), Regan, 261.
Habitat: Surinam.

A4. *Pseudacanthicus hystrix* (Cuvier & Valenciennes), ........Regan, 261.
Habitat: Rio Negro.

### LITHOXUS Eigenmann MS.

Type: *Lithoxus lithoides* Eigenmann.
Range that of the single species.

1. *Lithoxus lithoides* Eigenmann MS.
Habitat: Cataracts of British Guiana.

### ACANTHICUS Spix.

Type: *Acanthicus hystrix* Spix.
Range that of the single species.

A1. *Acanthicus hystrix* Spix, Regan, 262.
*Rhinelepis acanthicus* Cuvier & Valenciennes.
Habitat: Amazon; Guiana.

### HYPOPTOPOMA Günther.

Type: *Hypoptopoma thoracatum* Günther.
Range: Upper Amazon.

A1. *Hypoptopoma thoracatum* Günther, Regan, 263.
*Hypoptopoma bilobatum* Cope.
Habitat: Upper Amazon.

A2. *Hypoptopoma joberti* (Vaillant), Regan, 265.
*Otocinclus bilobatus* Steindachner, *non* Cope.
Habitat: Upper Amazon; Jurua.
*Hypoptopoma steindachneri* Boulenger.

A3. *Hypoptopoma thoracatum* Steindachner, *non* Günther.
Habitat: Amazons.

A4. *Hypoptopoma gulare* Cope, Regan, 265.
Habitat: Upper Amazon.

### OXYROPSIS Eigenmann & Eigenmann.

*Aristomata* Holmberg.
Type: *Oxyropsis wrightiana* Eigenmann & Eigenmann = *Hypostomus carinatus* Steindachner.
Range: Upper Amazon and Paraguay.

A1. *Oxyropsis carinatus* (Steindachner), Regan, 264.
*Oxyropsis wrightiana* E. & E.
Habitat: Upper Amazon.

2. *Oxyropsis inexpectatus* (Holmberg), Regan, 264.
*Oxyropsis güntheri* (Boulenger),
Habitat: Paraguay.

### OTOCINCLUS Cope.

*Hisonotus* Eigenmann & Eigenmann.
Type: *Otocinclus vestitus* Cope.
Range: Southeastern Brazil, Paraguay and Ambyiacu.

1. *Otocinclus affinis* Steindachner, Regan, 267.
Habitat: Santa Cruz.

2. *Otocinclus vittatus* Regan, ..Regan, 267.
Habitat: Paraguay.

A3. *Otocinclus vestitus* Cope, ..Regan, 267.
Habitat: Ambyiacu.

4. *Otocinclus flexilis* Cope, ....Regan, 267.
*Otocinclus fimbriatus* Cope.
Habitat: Rio Grande do Sul.

5. *Otocinclus leucofrenatus* Ribeiro, Ribeiro, 1908.
Habitat: Ribeira.

6. *Otocinclus notatus* (Eigenmann & Eigenmann), .............Regan, 268.

Habitat: Santa Cruz.

7. *Otocinclus gibbosus* Ribeiro, Ribeiro, 1908.
Habitat: Ribeira.

8. *Otocinclus tietensis* v. Ihering, v. I., 1907, 26.
Habitat: Tieté.

9. *Otocinclus paulinus* Regan, Regan, 1907, 799.
Habitat: Piracicaba.

10. *Otocinclus arnoldi* Regan, Regan, 1909, 235.
Habitat: La Plata.

### PAROTOCINCLUS Eigenmann & Eigenmann.

Type: *Otocinclus maculicauda* Steindachner.
Range that of the single species.

1. *Parotocinclus maculicauda* (Steindachner), ................Regan, 268.
Habitat: Santa Cruz to Ribeira.

### MICROLEPIDOGASTER Eigenmann & Eigenmann.

Type: *Microlepidogaster perforatus* Eigenmann & Eigenmann.
Range: Southeastern Brazil.

1. *Microlepidogaster nigricauda* (Boulenger), ................Regan, 268.
*Hisonotus lævior* and *leptochilus* Cope.
Habitat: Rio Grande do Sul.

2. *Microlepidogaster perforatus* Eigenmann & Eigenmann, ........Regan, 269.
Habitat: Rio Grande do Sul.

3. *Microlepidogaster lophophanes* (Eigenmann & Eigenmann), ..Regan, 269.
Habitat: Santa Cruz.

### LORICARIA Linnæus.

Type: *Loricaria dura* Linnæus = *Loricaria cataphracta* Linnæus.
*Parahemiodon, Hemiloricaria* and *Pseudohemiodon* Bleeker.
Range: La Plata to Panama and western Ecuador; all streams.

### (RHINELORICARIA Bleeker.)

(Type: *Loricaria lima* Kner.)

1. *Loricaria filamentosa* Steindachner, Regan, 274.
Habitat: Rio Magdalena; Berbice.

2. *Loricaria nigricauda* Regan, Regan, 275.
Habitat: Porto Real, Province Rio de Janeiro.

3. *Loricaria parva* Boulenger, Regan, 276.
Habitat: Paraguay.

A4. *Loricaria phoxocephala* Eigenmann & Eigenmann, ..........Regan, 276.
Habitat: Solimoens and Parana; Paraguay.

A5. *Loricaria lanceolata* Günther, Regan, 277.
Habitat: Xeberos and Canelos.

6. **Loricaria jubata** Boulenger, Regan, 278.
Habitat: Northwest Ecuador (St Javier, 60 feet; Rio Durango, 350 feet).

7. **Loricaria uracantha** Kner & Steindachner, .................Regan, 278.
Habitat: Atlantic and Pacific slope of Panama.

8. *Loricaria magdalenæ* Steindachner, Regan, 279.
Habitat: Rio Magdalena.

9. *Loricaria cadeæ* Hensel[1]...Regan, 279.
Habitat: Rio Cadea; Rio Grande do Sul.

A10. *Loricaria teffeana* Steindachner, Regan, 280.
Habitat: Solimoens and tributaries.

11. *Loricaria catamarcensis* Berg, Regan, 280.
Habitat: Bolivia; Argentina.

A12. *Loricaria konopickyi* Steindachner, Regan, 281.
Habitat: Rio Janeiro; Amazon.

13. *Loricaria steindachneri* Regan, Regan, 281.

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[1] According to Steindachner this is the female of *L. lima*.

*Loricaria lima* Steindachner, *non* Kner.
Habitat: Rio Preto to Rio Parahyba.

A14. **Loricaria lima** Kner, ... Regan, 282.
Habitat: Rio Parahyba to Para; both slopes of Panama.

15. *Loricaria lima microlepidota* Steindachner, .................. St., 1907*b*.
Habitat: Rio Jurua.

16. *Loricaria strigilata* Hensel, Regan, 283.
Habitat: Rio Grande do Sul.
*Loricaria henselii* Steindachner.
Habitat: Cubatao.

17. *Loricaria microlepidogaster* Regan, Regan, 283.
Habitat: Rio Grande do Sul.

18. *Loricaria cubatoensis* Steindachner, St., 1907*g*, 489.
Habitat: Cubatao.

19. *Loricaria latirostris* Boulenger, Regan, 283.
*Loricaria paulina* Boulenger.
Habitat: Rio Mogy-guassu, about 250 miles inland from Santos.

20. *Loricaria steinbachi* Regan, Regan, 1906, 97.
Habitat: Salta, Argentina

21. *Loricaria jaraguensis* Steindachner, St., 1909a
Habitat: Santa Catharina.

### (Pseudoloricaria Bleeker.)

(Type: *Loricaria læviuscula* Cuvier & Valenciennes.)

A22. *Loricaria læviuscula* Cuvier & Valenciennes, .............. Regan, 284.
Habitat: Amazons.

A23. *Loricaria punctata* Regan, Regan, 285.
Habitat: Porto do Moz to Barro do Rio Negro.

### (Loricariichthys Bleeker.)

(Type: *Loricaria maculata* Bloch.)

A24. *Loricaria maculata* Bloch, Regan, 286.
*Loricaria amazonica* Castelnau.
Habitat: Amazons; Guiana; Paraguay.

A25. *Loricaria typus* Bleeker, Regan, 286.
*Loricaria parahemiodon* Günther;
*Loricaria valenciennesi* Vaillant;
*Loricaria stübellii* Steindachner.
Habitat: Surinam; Amazons; Paraguay.

A26. *Loricaria acuta* Cuvier & Valenciennes, ................ Regan, 287.
*? Loricaria castanea* Castelnau.
Habitat: Amazon; Rio de Janeiro.

A27. *Loricaria nudirostris* Kner, Regan, 288.
Habitat: Rio Negro.

28. *Loricaria labialis* Boulenger, Regan, 288.
Habitat: Paraguay.

29. *Loricaria spixii* Steindachner, Regan, 289.
Habitat: Southeastern Brazil.

30. *Loricaria anus* Cuvier & Valenciennes, Regan, 289.
Habitat: La Plata and Rio Grande do Sul.

31. *Loricaria microdon* Eigenmann.
Habitat: Rupununi River, British Guiana.

32. *Loricaria grisea* Eigenmann.
Habitat: Essequibo River.

33. *Loricaria submarginata* Eigenmann.
Habitat: Potaro Basin.

A34. *Loricaria stewarti* Eigenmann.
Habitat: Chipoo Creek, Rio Branco Basin.

### (Loricaria Linnæus.)

35. *Loricaria evansii* Boulenger, Regan, 290.
Habitat: Rio Jungada, Matto Grosso, Brazil.

36. *Loricaria nudiventris* Cuvier & Valenciennes, .............. Regan, 290.
Habitat: Rio San Francisco.

37. *Loricaria macrops* Regan, Regan, 290.
Habitat: Rio de La Plata.

A38. *Loricaria cataphracta* Linnæus, Regan, 291.
*Loricaria cirrhosa* Bloch & Schneider; *Loricaria setifer* Lacépède; *Plecostomus flagellaris* Gronow; *Loricaria dura* Bleeker.
Habitat: Amazons; Guiana; Paraguay.

A39. *Loricaria parnahybæ* Steindachner, St., 1907.
Habitat: Rio Parnahyba.

A40. *Loricaria carinata* Castelnau, Regan, 292.
*Loricaria lata* Eigenmann & Eigenmann.
Habitat: Rio Jurua; Rio Paraguay; Matto Grosso; Goyaz.

A41. *Loricaria similima* Regan, Regan, 292.
*Loricaria filamentosa* Boulenger, *non* Steindachner.
Habitat: Canelos, East Ecuador.

42. *Loricaria apeltogaster* Boulenger, Regan, 292.
Habitat: Paraguay.

43. *Loricaria macrodon* Kner, Regan, 293.
Habitat: Rio Cuyaba.

44. *Loricaria piracicabæ* v. Ihering, v. I., 1907, 28.
Habitat: Piracicaba.

45. *Loricaria vetula* Cuvier & Valenciennes, .................Regan, 293.
Habitat: La Plata; Rio Janeiro.

46. *Loricaria variegata* Steindachner, Regan, 293.
Habitat: Rio Mamoni, near Chepo, Panama.

A47. *Loricaria macromystax* Günther, Regan, 294.
Habitat: Peruvian Amazon.

A48. *Loricaria lamina* Günther, Regan, 294.
Habitat: Peruvian Amazon.

49. *Loricaria laticeps* Regan, Regan, 295.
*Loricaria lamina* Boulenger, *non* Günther.
Habitat: Paraguay.

50. *Loricaria platycephala* (Kner).
Habitat: Rio Cuyaba.

51. *Loricaria brunnea* Hancock.
Habitat: British Guiana.

Doubtful species are the following:

52. *Loricaria platyura* Müller & Troschel.
Habitat: Rupununi.

53. *Loricaria caracasensis* Bleeker.
Habitat: Caracas.

54. *Loricaria bransfordi* Gill.
Habitat: Panama.

### HEMIODONTICHTHYS Bleeker.

Type: *Hemiodon acipenserinus* Kner.
Range that of the single species.

A1. *Hemiodontichthys acipenserinus* (Kner), ............Regan, 296.
Habitat: Amazon and Paraguay.

### REGANELLA Eigenmann.

Type: *Hemiodon depressus* Kner.
Range that of the single species.

1. *Reganella depressa* (Kner), Regan, 296.
Habitat: Rio Negro.

### HARTTIA Steindachner.

Type: *Harttia loricariiformis* Steindachner.
Range: southeastern Brazil; Solimoens and Surinam.

1. *Harttia loricariiformis* Steindachner, Regan, 298.
Habitat: Southeastern Brazil.

2. *Harttia platystoma* (Günther), Regan, 298.
Habitat: Surinam.

3. *Harttia kronei* Ribeiro, ..Ribeiro, 1907.
Habitat: Ribeira.

A4. *Harttia brevirostris* (Eigenmann & Eigenmann), ........Regan, 299.
Habitat: Iça.

### STURISOMA Swainson.

Type: *Loricaria rostrata* Spix.
Range: Rio Paraguay to Magdalena and Pacific slope of Panama and Ecuador.
*Oxyloricaria* Bleeker (*barbata*).

A1. *Sturisoma güntheri* Regan, Regan, 299.
*Loricaria rostrata* Günther, *non* Spix.
Habitat: Manacapuru; Xeberos.

2. *Sturisoma robustum* Regan, Regan, 300.
*Loricaria rostrata* Boulenger, *non* Spix.
Habitat: Paraguay.

A3. *Sturisoma lyra* Regan, . . Regan, 300.
*Loricaria rostrata* Boulenger, *non* Spix.
Habitat: Rio Jurua.

4. *Sturisoma barbatum* Kner, Regan, 301.
Habitat: Rio Cuyaba.

5. **Sturisoma panamense** Eigenmann & Eigenmann, . . . . . . . . . . . Regan, 201.
*Loricaria rostrata* Steindachner, *non* Spix; *Loricaria aurea* Steindachner.
Habitat: Rio Magdalena; Pacific slope of Panama.

6. **Sturisoma frenatum** (Boulenger), Regan, 302.
Habitat: Northwest Ecuador (St. Javier, 60 feet; Solidero, 350 feet; Rio Durango, 350 feet).

### FARLOWELLA Eigenmann & Eigenmann.

Type: *Acestra acus* Kner.
Range: Amazon and northward.
*Acestra* Kner, preoccupied.

A1. *Farlowella gladius* (Boulenger), Regan, 303.
Habitat: Rio Jurua.

2. *Farlowella gracilis* Regan, Regan, 303.
Habitat: Magdalena Basin.

A3. *Farlowella oxyrhynchus* (Kner), Regan, 304.
Habitat: Rio Mamore; Upper Amazon; Paraguay.

A4. *Farlowella kneri* (Steindachner), Regan, 304.
Habitat: Amazons of Peru and Ecuador.

5. *Farlowella aca* (Kner), . . . . Regan, 304.
Habitat: Venezuela.

A6. *Farlowella amazonum* (Günther), Regan, 305.
*Farlowella carinata* Eigenmann & Eigenmann.
Habitat: Amazons.

A7. *Farlowella gladiolus* (Günther), Regan, 305.
Habitat: Rio Cupai.

### NEOPLECOSTOMUS Eigenmann & Eigenmann.

Type: *Plecostomus microps* Steindachner.
Range that of the single species.

A1. *Neoplecostomus granosus* (Cuvier & Valenciennes), . . . . . . . . Regan, 306.
*Plecostomus microps* Steindachner.
Habitat: Goyaz; Cayenne; Rio de Janeiro; Rio Parahyba.

## Family CYCLOPIDÆ.

### CYCLOPIUM Swainson.[1]

*Arges* and *Brontes* Cuvier & Valenciennes; *Stygogenes* Günther.

Type: *Cyclopium humboldtii* Swainson.
Range: Mountain streams of northern South America on both slopes.

A1. **Cyclopium whymperi** (Boulenger), Regan, 311.
Habitat: Andes of Ecuador.

A2. **Cyclopium eigenmanni** (Regan), Regan, 312.
*Cyclopium cyclopium* Putnam, *non* Humboldt.

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[1] I have retained the species of this family as recognized by Regan. Evermann & Kendall (Proc. Biol. Soc., Wash., xviii, p. 91, 1905) think that many are probably synonyms.

I am not certain of the position of most of the localities of this genus, whether on the Amazonian or Pacific slope. I have taken it for granted that they are from the Atlantic slope unless specifically stated that they are from the Pacific side.

Habitat: Ecuador, on both slopes.

A3. *Cyclopium vaillanti* (Regan), Regan, 312.

Habitat: Huamani Peak, Ecuador, 10,700 feet.

4. *Cyclopium orientale* (Boulenger), Regan, 313.

Habitat: Albireggas and Milla Rivers, above Merida, Venezuela.

A5. *Cyclopium brachycephalus* (Günther), Regan, 313.

Habitat: Andes of Peru; Cuenca, Ecuador.

A6. **Cyclopium chotæ** (Regan), Regan, 313.

Habitat: Chota Valley, northern Ecuador.

7. *Cyclopium marmoratum* (Regan), Regan, 314.

Habitat: St. Augustine, Andes of Colombia.

A8. *Cyclopium longifile* (Steindachner), Regan, 314.

Habitat: Rio Huambo and Rio Totora, Peru.

A9. *Cyclopium sabalo* (Cuvier & Valenciennes), ............Regan, 315.

Habitat: Peruvian Andes.

A10. *Cyclopium taczanowski* (Boulenger), Regan, 315.

Habitat: Peruvian Andes.

A11. *Cyclopium prenadilla* (Cuvier & Valenciennes), ..........Regan, 316.

Habitat: Andes of Ecuador and Peru.

A12. *Cyclopium fissidens* (Regan), Regan, 316.

Habitat: Andes of Ecuador.

A13. *Cyclopium festæ* (Boulenger), Regan, 316.

Habitat: Eastern Ecuador.

14. *Cyclopium theresiæ* (Steindachner), St., 1907*b*.

Habitat: Andes of Cayandelet.

A15. *Cyclopium peruanum* (Steindachner), Regan, 317.

Habitat: Amable Maria, Peru.

A16. **Cyclopium simonsii** (Regan), Regan, 317.

Habitat: Huaras, Peru, 10,700 feet.

17. *Cyclopium homodon* (Regan), Regan, 309.

Habitat: Villeta, Colombia, 3,500 feet.

A18. *Cyclopium boulengeri* (Regan), Regan, 310.

*Stygogenes humboldtii* Boulenger, *non* Swainson.

Habitat: Canelos, Ecuador.

A19. *Cyclopium güntheri* (Boulenger), Regan, 310.

*? Arges homodon* Regan.

Habitat: Colombia.

20. **Cyclopium cyclopium** (Humboldt), Regan, 211.

*Cyclopium humboldtii* Swainson; (*C. prenadilla* Cuv. & Val.; *C. brachycephalus* Günther; *C. whymperi* Boulenger; *C. eigenmanni* Regan *fide* Evermann & Kendall).

Habitat: Andes near Quito.

21. *Cyclopium heterodon* (Regan), Regan, 1907, 799.

Habitat: Western Colombia.

22. *Cyclopium retrospina* (Regan), Regan, 1907, 800.

Habitat: Western Colombia.

### ASTROBLEPUS Humboldt.

Type: *Astroblepus grixalvii* Humboldt.

Range that of the single species.

1. *Astroblepus grixalvii* Humboldt, Regan, 318.

*? Arges güntheri* Boulenger; *? Arges brachycephalus* Günther.

Habitat: Popoyan; Rio Cauca.

## Order PLECTOSPONDYLI.

### Family CATOSTOMIDÆ.

Holarctic fishes entering the northern border of the tropics.

CARPIODES Rafinesque.

Type: *Catostomus cyprinus* Le Sueur.
Range: Guatemala through the Mississippi valley and Great Lakes.

1. *Carpiodes meridionalis* (Günther), Meek, 26.
   Habitat: Vera Cruz to the Usumacinta in Guatemala.
2. *Carpiodes tumidus* Baird & Girard, Meek, 27.
   Habitat: Rio Panuco to the Rio Grande.
3. *Carpiodes labiosus* Meek, ....Meek, 29.
   Habitat: Rio Panuco Basin.

PANTOSTEUS Cope.

Type: *Minomus platyrhynchus* Cope.
Range: From tropical America northward through the Rocky Mountains.

1. **Pantosteus plebeius** (Baird & Girard), Meek, 30.
   *Catostomus guzmaniensis* Girard; *Catostomus nebuliferus* Garman.
   Habitat: From the northern margin of tropical America at Durango northward.

MOXOSTOMA Rafinesque.

Type: *Catostomus anisurus* Rafinesque.
Range: Rio Lerma through the eastern United States.

1. **Moxostoma austrinum** Bean, Meek, 35.
   Habitat: Rio Lerma Basin and headwaters of the Rio Mezquital.

### Family CYPRINIDÆ.

XYSTROSUS Jordan & Snyder.

Type: *Xystrosus propoche* Jordan & Snyder.
Range that of the single species.

1. **Xystrosus popoche** Jordan & Snyder, Meek, 43.
   Habitat: Rio Lerma Basin.

ALGANSEA Girard.

Type: *Leuciscus tincella* Cuvier & Valenciennes.
Range: Lerma Basin.

1. **Algansea tincella** (Cuvier & Valenciennes), .................Meek, 44.
   *Ceratichthys sallœi* Günther.
   Habitat: Rio Lerma; valley of Mexico; Rio Panuco Basin.
2. **Algansea dugesi** Bean, ......Meek, 45.
   Habitat: Lerma Basin.
3. **Algansea rubescens** Meek, ..Meek, 46.
   Habitat: Lerma Basin.
4. **Algansea lacustris** Steindachner, Meek, 47.
   *Algansea tarascorum* Steindachner.
   Habitat: Lerma Basin.
5. **Algansea affinis** Regan, Regan, 1907–8, 151.
   Habitat: Rio Lerma.
6. *Algansea stigmatura* Regan, Regan, 1907–8, 152.
   Habitat: Mexico.

HYBOGNATHUS Agassiz.

Type: *Hybognathus nuchalis* Agassiz.
*Dionda* Girard; *Agoma* Girard.
Range: Border of tropical America northeastward through the Mississippi valley to the Delaware.

1. **Hybognathus episcopus** (Girard), Meek, 48.
   *Dionda melanops, couchi, amara, fluviatilis* Girard; *Hybognathus serenus, melanops* Jordan; *Hybognathus punctifer* Garman; *Hybognathus civilis* Cope; *Hybognathus episcopa* Jordan & Evermann.
   Habitat: Rio Mezquital to Texas.
2. *Hybognathus rasconis* (Jordan & Snyder), .................. Meek, 50.
   Habitat: Panuco Basin.

### Leuciscus Cuvier.

Type: *Cyprinus leuciscus* Linnæus.

Range: Europe, Asia and North America.

1. **Leuciscus nigrescens** (Girard), Meek, 55.
   *Tigoma pulchella, pulchra* Girard; *Gila conspersa, nigrescens, modesta* Garman; *Leuciscus purpureus* Rutter; *Leuciscus niger* Bean.
   Habitat: Headwaters of Rio Mezquital and northward.

### Falcula Jordan & Snyder.

Type: *Falcula chapalæ* Jordan & Snyder.

Range that of the single species.

1. **Falcula chapalæ** Jordan & Snyder, Meek, 58.
   Habitat: Lerma Basin.

### Aztecula Jordan & Evermann.

Type: *Notropis aztecus* Woolman.

Range: Central Mexico.

*Azteca* Jordan & Evermann.

1. **Aztecula vittata** (Girard), .. Meek, 59.
   *Notropis aztecus* Woolman.
   Habitat: Valley of Mexico and the Rio Balsas Basin.
2. **Aztecula lermæ** (Evermann & Goldsborough), ............ Meek, 60.
   Habitat: Rio Lerma Basin.
3. **Aztecula mexicana** Meek, .. Meek, 61.
   Habitat: Mexican Plateau.

### Notropis Rafinesque.

Type: *Notropis atherinoides* Rafinesque.

*Codoma, Alburnops, Moniana* Girard; *Graodus* Günther; *Orcella* Jordan & Evermann; *Nototropis* Meek.

Range: Rio Balsas north through the eastern slope of America.

1. **Notropis calientis** Jordan & Snyder, Meek, 65.
   Habitat: Lerma Basin.
2. **Notropis boucardi** (Günther), Meek, 67.
   *Graodus nigrotæniatus* Günther.
   Habitat: Rio Balsas.
3. **Notropis ornatus** (Girard).
   Habitat: Rio Mezquital and northward.
4. *Notropis forlonensis* Meek, .. Meek, 70.
   Habitat: Rio Panuco Basin.

### Evarra Woolman.

Type: *Evarra eigenmanni* Woolman.

Range: Valley of Mexico.

1. **Evarra eigenmanni** Woolman, Meek, 77.
   Habitat: Valley of Mexico.
2. **Evarra tlahuacensis** Meek, .. Meek, 78.
   Habitat: Valley of Mexico.

### Hybopsis Agassiz.

Type: *Hybopsis gracilis* Agassiz.

*Yuriria* Jordan & Evermann.

Range: Rio Lerma northeast through the Mississippi Valley and California?

1. **Hybopsis altus** (Jordan), .. Meek, 81.
   Habitat: Rio Lerma Basin.

## Family CHARACIDÆ.

### Subfamily ANODINÆ.

#### ANODUS Spix.

*Elopomorphus* Gill.
Type: *Anodus elongatus* Spix.
Range: Amazons and Orinoco.

1. *Anodus elongatus* Spix.
*Elopomorphus jordani* Gill; *Anodus steatops* Cope.
Habitat: Amazons.

#### EIGENMANNINA Fowler.

Type: *Anodus melanopogon* Cope.
Range: Amazon and Orinoco.

1. *Eigenmannina orinocensis* (Steindachner).
Habitat: Orinoco River.

A2. *Eigenmannina melanopogon* (Cope).
Habitat: Peruvian Amazon.

### Subfamily CURIMATINÆ.

#### POTAMORHINA Cope.

Type: *Curimatus pristigaster* Steindachner.
Range: Solimoens and Marañon.

A1. *Potamorhina pristigaster* (Steindachner).
Habitat: Amazons from Rio Negro to Peru.

#### PSECTROGASTER Eigenmann & Eigenmann

Type: *Psectrogaster rhomboides* Eigenmann & Eigenmann.
Range: Rio Paraguay northward.

1. *Psectrogaster rhomboides* Eigenmann & Eigenmann.
*Curimatus cyprinoides* Steindachner, *non* Linnæus.
Habitat: Rio Puty.

2. *Psectrogaster curviventris* Eigenmann & Kennedy.
Habitat: Rio Paraguay.

3. *Psectrogaster auratus* Gill.
Habitat: Bolivia.

A4. *Psectrogaster amazonicus* Eigenmann & Eigenmann.
*Anodus ciliatus* Müller & Troschel.
Habitat: Amazons.

A5. *Psectrogaster ciliatus* (Müller & Troschel).
Habitat: Amazon and its tributaries; Guiana; Rios Parana and Paraguay.

#### CURIMATOPSIS Steindachner.

Type: *Curimatopsis macrolepis* Steindachner.
Range: Amazons.

A1. *Curimatopsis macrolepis* Steindachner.
Habitat: Amazons and tributaries from Rio Negro to Tabatinga.

A2. *Curimatopsis microlepis* Eigenmann & Eigenmann.
Habitat: Jatuarana.

#### CURIMATELLA Eigenmann & Eigenmann.

Type: *Curimatella lepidurus* Eigenmann & Eigenmann.
Range: Paraguay and San Francisco and northward to Guiana.

1. *Curimatella lepidurus* Eigenmann & Eigenmann.
Habitat: Rio San Francisco.

A2. *Curimatella meyeri* (Steindachner).
Habitat: Amazons.

A3. *Curimatella serpæ* Eigenmann & Eigenmann.
Habitat: Serpa.

A4. *Curimatella alburna* (Müller & Troschel).
Habitat: Guaporé, northward to Amazons and Guiana; Paraguay.

5. *Curimatella alburna australis* Eigenmann & Kennedy.
Habitat: Paraguay.

A6. *Curimatella alburna lineata* Eigenmann & Eigenmann.
Habitat: Jutahy.

A7. *Curimatella alburna caudimaculata* Pellegrin, ........Pellegrin, 1909, 150.
Habitat: Amazons.

A8. *Curimatella xinguensis* Steindachner.
Habitat: Xingu.

### CURIMATUS OKEN.

*Cyphocharax*, *Steindachnerina* and *Peltapleura* Fowler.

Type: *Salmo edentulus* Bloch = *Salmo cyprinoides* Linnæus.

Range: Every stream from Panama to the Rio de La Plata on the eastern slope and on the western slopes of Panama and Ecuador.

A1. *Curimatus spilurus* Günther.
Habitat: Orinoco and Guiana, Amazons and Paraguay.

2. *Curimatus gilli* Eigenmann & Kennedy.
Habitat: Paraguay Basin.

A3. *Curimatus spiluropis* Eigenmann & Eigenmann.
Habitat: Iça and Solimoens and Parana Basins.

A4. *Curimatus dorsalis* Eigenmann & Eigenmann.
Habitat: Amazon and Solimoens.

A5. *Curimatus albulus* Lütken.
Habitat: Rio das Velhas.

6. *Curimatus nasus* Steindachner.
Habitat: Ecuador and Paraguay Basin.

7. *Curimatus conspersus* Holmberg.
Habitat: Paraguay.

8. **Curimatus troschelii** Günther.
Habitat: Western slopes of Ecuador.

9. *Curimatus nigrotænia* Boulenger.
Habitat: Matto Grosso.

10. *Curimatus elegans* Steindachner.
Habitat: Coastwise streams of southeastern Brazil; Paraguay.

11. *Curimatus elegans nitens* Holmberg.
*Curimatus nitens* Holmberg; *Curimatus elegans paraguayensis* Eigenmann & Kennedy.
Habitat: Paraguay Basin.

A12. *Curimatus elegans bahiensis* Eigenmann & Eigenmann.
Habitat: Bahia.

13. *Curimatus argenteus* Gill.
Habitat: Trinidad.

A14. *Curimatus bimaculatus* Steindachner.
Habitat: Solimoens, Amazon and Paraguay Basin.

15. *Curimatus bimaculatus sialis* Eigenmann & Eigenmann.
Habitat: Lake Manacapuru.

A16. *Curimatus bimaculatus trachystethus* Cope.
Habitat: Amazons at Serpa and Peru.

A17. *Curimatus dobula* Günther.
Habitat: Eastern slope of Peru and Ecuador.

A18. *Curimatus güntheri* Eigenmann & Eigenmann.
Habitat: Tabatinga.

19. *Curimatus microcephalus* Eigenmann & Eigenmann.
Habitat: Surinam.

20. **Curimatus magdalenæ** Steindachner.
Habitat: Rivers Mamoni and Magdalena.

A21. *Curimatus notatus* Steindachner.
Habitat: Para.

22. *Curimatus gilberti* Quoy & Gaimard.
*Curimatus voga* Hensel; *Curimatus albula* Lütken.
Habitat: Southeastern Brazil; Paraguay Basin.

23. *Curimatus gilberti brevipinnis* Eigenmann & Eigenmann.
Habitat: La Plata Basin.

A24. *Curimatus plumbeus* Eigenmann & Eigenmann.
Habitat: Lake Hyanuary to Obidos.

25. *Curimatus nägelii* Steindachner.
Habitat: Rio Janeiro.

A26. *Curimatus leucostictus* Eigenmann & Eigenmann.
Habitat: Rio Negro and Lago Alexo.

A27. *Curimatus brevipes* Eigenmann & Ogle.
Habitat: Peru?

28. *Curimatus platanus* Günther.
Habitat: Rio de La Plata.

A29. *Curimatus asper* Günther.
Habitat: Eastern slope of Peru.

A30. *Curimatus rutiloides* Kner.
Habitat: Rios Solimoens, Marañon and Paraguay, with their tributaries.

A31. *Curimatus hypostomus* Boulenger.
Habitat: Eastern slopes of Peru.

32. *Curimatus mivartii* Steindachner.
Habitat: Magdalena Basin.

A33. *Curimatus leuciscus* Günther.
Habitat: Amazons.

34. *Curimatus leuciscus boliviæ* Eigenmann & Ogle.
Habitat: Bolivia.

A35. *Curimatus vittatus* Kner.
Habitat: Solimoens and tributaries.

A36. *Curimatus ocellatus* Eigenmann & Eigenmann.
Habitat: Xingu.

A37. *Curimatus isognathus* Eigenmann & Eigenmann.
Habitat: Solimoens.

A38. *Curimatus knerii* Steindachner.
*Curimatus cyprinoides* Kner (not of Linnæus).
Habitat: Amazons and northward.

A39. *Curimatus cyprinoides* (Linnæus).
*Salmo edentulus* Bloch.
Habitat: Amazons and northward.

40. **Curimatus boulengeri** Eigenmann nom. nov.
*Curimata güntheri* Boulenger (not E. & E.).
Habitat: Rio Vinces, Ecuador.

41. *Curimatus macrops* Eigenmann & Eigenmann.
Habitat: Rios Puty and Conçallo.

A42. *Curimatus falcatus* Eigenmann & Eigenmann.
Habitat: Xingu.

A43. *Curimatus simulatus* Eigenmann & Eigenmann.
Habitat: Upper Solimoens.

44. *Curimatus copei* Fowler.
Habitat: Surinam.

45. *Curimatus schomburgkii* Günther.
Habitat: Guianas.

46. *Curimatus essequibensis* Günther.
*Anodus cyprinoides* Müller & Troschel.
Habitat: Essequibo.

A47. *Curimatus aureus* Pellegrin,
Pellegrin, 1908, 342.
Habitat: Rio Guayas, Ecuador.

### SEMITAPICIS Eigenmann & Eigenmann.

Type: *Charax planirostris* Gronow.
Range: Maracaibo to Argentina; not in southeastern coastwise streams.

A1. *Semitapicis planirostris* (Gronow).
*Curimatus abramoides* Kner.
Habitat: Rio Negro to Obidos.

A2. *Semitapicis laticeps* (Cuvier & Valenciennes).
*Curimatus altamazonicus* Cope.
Habitat: Lake Maracaibo to the Rio Paraguay.

### GASTEROTOMUS Eigenmann.

Type: *Anodus latior* Spix.
Range that of the single species.

A1. *Gasterotomus latior* (Spix).
Habitat: Amazons south to Argentina; not in southeast coastwise streams.

## Subfamily PARODONTINÆ.

### PARODON Cuvier & Valenciennes.

Type: *Parodon suborbitalis* Cuvier & Valenciennes.
Range: Colombia to the Rios San Francisco and La Plata; not in coastwise streams of southeastern Brazil.

A1. *Parodon suborbitalis* Cuvier & Valenciennes.
*Parodon nasus* Kner; *Parodon hilarii* Reinhardt.
Habitat: Lake Maracaibo to Cujaba and Rio das Velhas.

A2. *Parodon buckleyi* Boulenger.
Habitat: Eastern Ecuador.

3. *Parodon gestri* Boulenger.
Habitat: Rio Coxipo.

4. *Parodon affinis* Steindachner.
Habitat: La Plata Basin.

5. *Parodon caliensis* Boulenger.
Habitat: Colombia.

6. *Parodon tortuosus* Eigenmann & Norris.
Habitat: Parana and Paraguay Basins.

7. *Parodon paraguayensis* Eigenmann.
Habitat: Rio Paraguay.

8. *Parodon piracicabæ* Eigenmann.
Habitat: Piracicaba.

### SACCODON Kner.

Type: *Saccodon wagneri* Kner & Steindachner.
Range: Pacific slope of Ecuador.

1. **Saccodon wagneri** Kner & Steindachner.
Habitat: Western Ecuador.

2. **Saccodon craniocephalum** Thominot.
Habitat: Western Ecuador.

## Subfamily HEMIODINÆ.

### HEMIODUS Müller.

Type: *Salmo unimaculatus* Bloch.
Range: Orinoco to the Rio San Francisco, the Peruvian Amazon and the upper courses of the Paraguay; not in coastwise streams of southeastern Brazil.

A1. *Hemiodus unimaculatus* (Bloch).
*Hemiodus crenidens* Müller.
Habitat: Guianas to the Paraguay River.

A2. *Hemiodus semitæniatus* Kner.
Habitat: Matto Grosso, French Guiana.

A3. *Hemiodus fowleri* Steindachner.
Habitat: Amazon.

A4. *Hemiodus gracilis* Günther.
Habitat: Rios Cupai and San Francisco.

A4. *Hemiodus immaculatus* Kner.
Habitat: Orinoco to the Amazon.

6. *Hemiodus longiceps* Kner.
Habitat: Rios Icanno and Capin.

A7. *Hemiodus microlepis* Kner.
Habitat: Solimoens and Marañon and their affluents; Paraguay.

A8. *Hemiodus goeldii* Steindachner,
St., 1908*a*.
Habitat: Xingu.

9. *Hemiodus quadrimaculatus* Pellegrin,
Pellegrin, 1908, 343.
Habitat: French Guiana.

10. *Hemiodus argenteus* Pellegrin,
Pellegrin, 1908, 344.
Habitat: Orinoco.

### ANISITSIA Eigenmann.

Type: *Anodus notatus* Schomburgk.
Range: Guianas to Asuncion on the Paraguay. Not in the coastwise streams of southeastern Brazil.

1. *Anisitsia kappleri* (Günther).
Habitat: Surinam.

A2. *Anisitsia notata* (Schomburgk).
*Hemiodus microcephalus* Günther.
Habitat: Guianas to the Araguay and Guaporé.

A3. *Anisitsia amazonum* (Humboldt).
*Curimatus amazonum* Humboldt; *Prochilodus humboldtii* Cuvier & Valenciennes.
Habitat: Amazons.

4. *Anisitsia othonops* Eigenmann & Kennedy.
Habitat: Paraguay Basin.

### Subfamily PROCHILODINÆ.

#### PROCHILODUS Agassiz.

*Pacu* Spix; *Chilomyzon* Fowler.
Type: *Prochilodus argenteus* Agassiz.
Range: Western Ecuador; La Plata to the Magdalena and Peru in all streams.

1. **Prochilodus humeralis** Günther.
Habitat: Western Ecuador.

2. *Prochilodus steindachneri* Fowler.
Habitat Parahyba.

3. *Prochilodus vimboides* Heckel.
Habitat: Southeastern Brazil.

4. *Prochilodus oligolepis* Günther.
Habitat: Ypanema.

5. *Prochilodus longirostris* Steindachner.
Habitat: Magdalena Basin.

6. *Prochilodus brevis* Steindachner.
Habitat: Southeastern Brazil.

A7. *Prochilodus rubrotæniatus* Schomburgk.
*Prochilodus nigricans* Günther.
Habitat: Magdalena to Essequibo and Rio Negro.

8. *Prochilodus lacustris* Steindachner.
Habitat: Parnahyba.

A9. *Prochilodus cephalotes* Cope.
Habitat: Eastern Peru.

10. *Prochilodus magdalenæ* Steindachner.
*Prochilodus asper* Steindachner.
Habitat: Magdalena Basin.

11. *Prochilodus asper* Lütken.
Habitat: Venezuela.

12. *Prochilodus hartii* Steindachner.
Habitat: Southeastern Brazil.

13. *Prochilodus reticulatus* Valenciennes.
Habitat: Alta Parana to Alto Beni; Maracaibo.

A14. *Prochilodus ortonianus* Cope.
Habitat: Peruvian Amazon.

A15. *Prochilodus insignis* Schomburgk.
Habitat: Guiana and Amazons.

A16. *Prochilodus dobulinus* Cuvier & Valenciennes.
Habitat: Amazon.

17. *Prochilodus affinis* Reinhardt.
Habitat: San Francisco Basin.

18. *Prochilodus argenteus* Agassiz.
*Prochilodus costatus* Cuvier & Valenciennes.
Habitat: Paraguay Basin to the Rio San Francisco.

19. *Prochilodus platensis* Holmberg.
Habitat: La Plata Basin.

20. *Prochilodus scrofa* Steindachner.
Habitat: Paraguay to Rio de Janeiro.

21. *Prochilodus lineatus* (Valenciennes).
Habitat: La Plata Basin.

A22. *Prochilodus nigricans* Agassiz.
Habitat: La Plata and Amazon systems.

A23. *Prochilodus binotatus* Schomburgk.
Habitat: Rio Negro Basin.

24. *Prochilodus laticeps* Steindachner.
Habitat: Orinoco Basin.

A25. *Prochilodus brama* Cuvier & Valenciennes.
Habitat: Orinoco and Amazons.

A26. *Prochilodus tæniurus* Valenciennes.
Habitat: Amazons.

A27. *Prochilodus caudofasciatus* Starks, Starks, 1907, 773.
Habitat: Rio Perené, Peru.

### Subfamily CHILODINÆ.

#### CÆNOTROPUS Günther.

*Microdus* Kner.
Type: *Microdus labyrinthicus* Kner.
Range: Orinoco and Rio Capin.

A1. *Cænotropus labyrinthicus* (Kner).
Habitat: Rio Orinoco to Rio Capin.

#### CHILODUS Müller & Troschel.

Type: *Chilodus punctatus* Müller & Troschel.
Range: Guianas.

1. *Chilodus punctatus* Müller & Troschel.
*Citharinus chilodus* Cuvier & Valenciennes.
Habitat: Guianas.

Subfamily GYMNOCHARACININÆ.

GYMNOCHARACINUS Steindachner.
Type: *Gymnocharacinus bergii* Steindachner.
Range that of the single species.
1. *Gymnocharacinus bergii* Steindachner.
Habitat: South of Buenos Aires.

Subfamily ANOSTOMATINÆ.

LÆMOLYTA Cope.
*Schizodontopsis* Garman.
Type: *Schizodon tæniatus* Kner.
Range: Orinoco, Amazons.
A1. *Læmolyta tæniata* (Kner).
Habitat: Amazons.

ANOSTOMUS Gronow.
*Pithecocharax* Fowler.
Type: *Salmo anostomus* Linnæus.
Range: Amazon valley and northward.
A1. *Anostomus anostomus* (Linnæus).
*Anostomus salmoneus* Gronow.
Habitat: Essequibo and Jutahy.
A2. *Anostomus gracilis* (Kner).
Habitat: Rio Guaporé.
A3. *Anostomus trimaculatus* Kner.
Habitat: Amazons and affluents.
A4. *Anostomus ucayalensis* (Fowler).
Habitat: Peruvian Amazon.
A5. *Anostomus proximus* Garman.
Habitat: Villa Bella; Ueranduba.
A6. *Anostomus varians* Garman.
Habitat: Amazons.
A7. *Anostomus varians nitens* Garman.
Habitat: Iça.
8. *Anostomus orinocensis* Steindachner.
Habitat: Orinoco.

SCHIZODON Agassiz.
Type: *Schizodon fasciatus* (Spix).
Range: La Plata to Venezuela.
A1. *Schizodon vittatus* (Cuvier & Valenciennes).
Habitat: La Plata to Amazon.
A2. *Schizodon fasciatus* (Spix).
Habitat: Venezuela and Amazon; Paraguay.
3. *Schizodon borelli* Boulenger.
Habitat: Upper Paraguay?
4. *Schizodon dissimilis* (Garman).
*Anostomus fasciatus* Eigenmann & Kennedy.
Habitat: Rio Puty; Paraguay Basin.
A5. *Schizodon isognathus* Kner.
Habitat: Cujaba, Apuré.
6. *Schizodon knerii* (Steindachner).
Habitat: Rio Grande do Sul to Rio San Francisco.
7. *Schizodon platæ* Garman.
Habitat: La Plata.
A8. *Schizodon elongatus* Steindachner,
St., 1908*a*.

LAHILLIELLA Eigenmann & Kennedy.
Type: *Schizodon nasutus* Kner.
1. *Lahilliella nasuta* (Kner).
Habitat: Rio Puty and La Plata basin.

RHYTIODUS Kner.
*Garmanina* Fowler.
Type: *Rhytiodus microlepis* Kner.
Range: Rio Negro to Peru.
A1. *Rhytiodus microlepis* Kner.
Habitat: Barra do Rio Negro.
A2. *Rhytiodus argenteofuscus* Kner.
*Schizodon sagittarius* Cope.
Habitat: Rio Negro to Peruvian Amazon.

### ANOSTOMOIDES Pellegrin.

Type: *Anostomoides atrianalis* Pellegrin.
Range that of the single species.

1. *Anostomoides atrianalis* Pellegrin.
Habitat: Orinoco.

### LEPORINUS Agassiz.

*Abramites* Fowler.
Type: *Leporinus novemfasciatus* Agassiz = *Salmo fasciatus* Bloch.
Range: All east slope streams from the Magdalena to the La Plata.

A1. *Leporinus nattereri* Steindachner.
Habitat: Amazon.

A2. *Leporinus striatus* Kner.
Habitat: Rio Magdalena, Peruvian Amazon and Paraguay.

3. *Leporinus macrolepidotus* Peters.
Habitat: Rio Janeiro.

A4. *Leporinus melanopleura* Günther.
Habitat: Bahia and Cipo.

5. *Leporinus tæniatus* Lütken.
Habitat: Rio das Velhas.

A6. *Leporinus nigrotæniatus* (Schomburgk).
Habitat: Guiana and middle course of the Amazons.

A7. *Leporinus semivittatus* Boulenger.
Habitat: Rio Negro.

A8. *Leporinus mülleri* Steindachner.
Habitat: Orinoco, Solimoens and Marañon.

A9. *Leporinus agassizii* Steindachner.
Habitat: Solimoens.

A10. *Leporinus megalepis* Günther.
*Leporinus marcgravii* Lütken.
Habitat: Guianas; Peruvian Amazon and Rio de Janeiro.

A11. *Leporinus bimaculatus* Castelnau.
*Leporinus frederici* Eigenmann & Norris, *non* Bloch.
Habitat: Goyaz to Taubaté.

12. *Leporinus steindachneri* Eigenmann.
*Leporinus affinis* Steindachner, *non* Günther.
Habitat: Southeastern Brazil.

13. *Leporinus muyscarum* Steindachner.
Habitat: Colombia.

A14. *Leporinus friderici* Bloch.
*Curimatus acutidens* Valenciennes; *Leporinus leschenaultii* Cuvier & Valenciennes; *Leporinus megalepis* Günther, in part.
Habitat: Venezuela; Guianas to La Plata.

15. *Leporinus reinhardti* Lütken.
*Leporinus affinis* Lütken, not of Günther.
Habitat: Rio das Velhas.

A16. *Leporinus obtusidens* Valenciennes.
*Leporinus pachyurus* Cuvier & Valenciennes; *? Leporinus elongatus* Cuvier & Valenciennes.
Habitat: La Plata Basin; Rio Grande do Sul; Rio Cipo; Magdalena Basin.

17. *Leporinus silvestrii* Boulenger.
Habitat: Matto Grosso.

18. *Leporinus bahiensis* Steindachner.
Habitat: Bahia.

19. *Leporinus copelandi* Steindachner.
Habitat: Southeastern Brazil; Tieté.

A20. *Leporinus trifasciatus* Steindachner.
Habitat: Huallaga and Paraguay Basin.

21. *Leporinus eques* Steindachner.
Habitat: Rio Magdalena and Rio Paraguay.

A22. *Leporinus affinis* Günther.
Habitat: Orinoco; Rio Capin and La Plata Basin.

23. *Leporinus mormyrops* Steindachner.
Habitat: Parahyba.

24. *Leporinus solarii* Holmberg.
Habitat: Rio de La Plata.

A25. *Leporinus hypselonotus* Günther.
Habitat: Orinoco; Solimoens; Marañon; Paraguay.

26. *Leporinus conirostris* Steindachner.
Habitat: Southeastern Brazil; Paraguay; São Paulo.

A27. *Leporinus holostistus* Cope.
Habitat: Peruvian Amazon.

A28. *Leporinus fasciatus* (Bloch).
*Leporinus novemfasciatus* Agassiz.
Habitat: Venezuela and Guianas to the Paraguay.

A29. *Leporinus multifasciatus* Cope.
Habitat: Peruvian Amazon.

30. *Leporinus margaritaceus* Günther.
Habitat: British Guiana.

A31. *Leporinus maculatus* Müller & Troschel.
Habitat: Guianas to Goyaz.

## Subfamily LEPORELLINÆ.

### LEPORELLUS Lütken.

Type: *Leporinus pictus* Kner=*Leporinus vittatus* Cuvier & Valenciennes.

Range that of the single species.

A1. *Leporellus vittatus* (Cuvier & Valenciennes).
*Leporinus pictus* Kner; *Leporinus maculifrons* Reinhardt.
Habitat: Magdalena to Rio das Velhas.

## Subfamily NANNOSTOMATINÆ.

### NANNOSTOMUS Günther.

Type: *Nannostomus beckfordii* Günther.

Range: Guiana; Amazons; Paraguay.

1. *Nannostomus beckfordii* Günther.
Habitat: Demarara.

A2. *Nannostomus anomalus* Steindachner.
Habitat: Rio Negro and Amazon.

3. *Nannostomus marginatus* Eigenmann.
Habitat: British Guiana.

4. *Nannostomus minimus* Eigenmann.
Habitat: Potaro River.

5. *Nannostomus simplex* Eigenmann.
Habitat: Lama Stop off, British Guiana.

### PŒCILOBRYCON Eigenmann.

Type: *Pœcilobrycon harrisoni* Eigenmann.

1. *Pœcilobrycon harrisoni* Eigenmann.
Habitat: Christianburg, British Guiana.

2. *Pœcilobrycon auratus* Eigenmann.
Habitat: Essequibo River.

3. *Pœcilobrycon erythrurus* Eigenmann.
Habitat: Essequibo Basin.

4. *Pœcilobrycon ocellatus* Eigenmann.
Habitat: British Guiana.

A5. *Pœcilobrycon trifasciatus* Steindachner.
Habitat: Amazons and affluents.

A6. *Pœcilobrycon eques* Steindachner.
Habitat: Peruvian Amazon.

A7. *Pœcilobrycon unifasciatus* Steindachner.
Habitat: Amazons.

### CHARACIDIUM Reinhardt.

*Chorimycterus* Cope; *Nannognathus* Boulenger; *Pœcilasomatops* Fowler.

Type: *Characidium fasciatum* Reinhardt.

Range: Orinoco south to the Rio San Francisco and the La Plata Basin.

A1. *Characidium etheostoma* Cope.
Habitat: Ambyiacu.

2. *Characidium borellii* (Boulenger).
Habitat: San Pablo, Argentina.

A3. *Characidium fasciatum* Reinhardt.
Habitat: Orinoco south to the Rio das Velhas and the La Plata Basin.

A4. *Characidium purpuratum* Steindachner.
Habitat: Ecuador.

A5. *Characidium steindachneri* Cope.
Habitat: Peruvian Amazon.

6. *Characidium tenue* (Cope).
Habitat: Rio Grande do Sul.

7. *Characidium laterale* Eigenmann.
Habitat: Potaro River.

8. *Characidium vintoni* Eigenmann.
Habitat: Shrimp Creek near Kaieteur.
9. *Characidium blennioides* Eigenmann.
Habitat: British Guiana.
A10. *Characidium zebra* Eigenmann.
Habitat: Rio Branco Basin.
11. *Characidium pellucidum* Eigenmann.
Habitat: Gluck Island, Essequibo River.
12. *Characidium pteroides* Eigenmann.
Habitat: Essequibo River.
13. *Characidium catenatum* Eigenmann.
Habitat: Essequibo River.
A14. *Characidium brevirostris* Pellegrin.
Habitat: Northern Brazil.

### ARCHICHEIR Eigenmann.

Type: *Archicheir minutus* Eigenmann.
Range that of the single species.
1. *Archicheir minutus* Eigenmann.
Habitat: Christianburg, British Guiana.

### MICROCHARAX Eigenmann.

Type: *Nannostomus lateralis* Boulenger.
Range that of the single species.
1. *Microcharax lateralis* (Boulenger).
Habitat: Paraguay Basin.

### JOBERTINA Pellegrin.

Type: *Jobertina interrupta* Pellegrin.
Range that of the single species.
1. *Jobertina interrupta* Pellegrin.
Habitat: Serra d'Estrello, Brazil.

## Subfamily PYRRHULININÆ.

### COPEINA Fowler.

Type: *Pyrrhulina argyrops* Cope.
Range: Amazons.
A1. *Copeina nattereri* (Steindachner).
Habitat: Amazons.
A2. *Copeina guttata* (Steindachner).
Habitat: Amazons.
A3. *Copeina argyrops* (Cope).
Habitat: Amazons.

### POGONOCHARAX Regan.

Type: *Pogonocharax rehi* Regan.
1. *Pogonocharax rehi* Regan,
Habitat: Argentina.

### PYRRHULINA Cuvier & Valenciennes.

Type: *Pyrrhulina filamentosa* Cuvier & Valenciennes.
Range: Paraguay and Amazons; Surinam.
A1. *Pyrrhulina læta* Cope.
Habitat: Ambyiacu.
2. *Pyrrhulina australis* Eigenmann & Kennedy.
*Pyrrhulina semifasciata* Boulenger (*non* Steindachner).
Habitat: Paraguay and tributaries.
A3. *Pyrrhulina melanostoma* (Cope).
Habitat: Ecuador.
4. *Pyrrhulina filamentosa* Cuvier & Valenciennes.
Habitat: Surinam.
A5. *Pyrrhulina semifasciata* Steindachner.
Habitat: Amazons.
A6. *Pyrrhulina brevis* Steindachner.
Habitat: Paraguay and Amazons.
A7. *Pyrrhulina maxima* Eigenmann & Eigenmann.
Habitat: Solimoens.

## Subfamily APHIOCHARACINÆ.

### CŒLURICHTHYS Ribeiro.

Type: *Cœlurichthys iporangæ* Ribeiro.
Range that of the single species.
1. *Cœlurichthys iporangæ* Ribeiro.
Habitat: Ribeira.

### Holoshesthes Eigenmann.

Type: *Cheirodon pequira* Natterer.
Range that of the single species.

A1. *Holoshesthes pequira* (Natterer).
Habitat: Upper Paraguay and Rio Guaporé.

### Odontostilbe Cope.

Type: *Odontostilbe fugitiva* Cope.
Range: Trinidad; Ecuador and Paraguay.

1. *Odontostilbe pulcher* (Gill).
Habitat: Trinidad.

A2. *Odontostilbe fugitiva* Cope.
Habitat: Ecuador.

3. *Odontostilbe microcephala* Eigenmann.
Habitat: Pilcomayo.

4. *Odontostilbe paraguayensis* Eigenmann & Kennedy.
Habitat: Paraguay.

5. *Odontostilbe trementinæ* Eigenmann & Kennedy.
Habitat: Paraguay.

### Cheirodon Girard.

Type: *Cheirodon pisciculus* Girard.
Range: Magdalena; Amazon south to the Rio San Francisco, and the La Plata Basin; western slope of Chili.

1. *Cheirodon interruptus* (Jenyns).
Habitat: La Plata Basin.

2. *Cheirodon monodon* Cope.
Habitat: Rio Grande do Sul.

3. *Cheirodon annæ* McAtee.
Habitat: "South America."

4. **Cheirodon pisciculus** Girard.
Habitat: Chili.

A5. *Cheirodon nattereri* Steindachner.
*Cheirodon pulcher* Steindachner, *non* Gill; *Cheirodon steindachneri* Eigenmann & Eigenmann.
Habitat: Amazon; Paraguay.

6. *Cheirodon calliurus* Boulenger.
Habitat: Matto Grosso.

A7. *Cheirodon insignis* Steindachner.
Habitat: Amazon; Magdalena; Paraguay.

8. *Cheirodon piaba* Lütken.
Habitat: San Francisco Basin.

9. *Cheirodon ribeiroi* Eigenmann.
Habitat: Rio Paraguay.

A10. *Cheirodon micropterus* Eigenmann.
Habitat: Lower Amazon.

### Aphyocharax Günther.

Type: *Aphyocharax pusillus* Günther.
Range: Amazons south to the Paraguay.

1. *Aphyocharax rathbuni* Eigenmann.
Habitat: Paraguay.

2. *Aphyocharax dentatus* Eigenmann & Kennedy.
Habitat: Paraguay.

3. *Aphyocharax anisitsi* Eigenmann & Kennedy.
Habitat: Paraguay.

A4. *Aphyocharax pusillus* Günther.
Habitat: Marañon Basin.

A5. *Aphyocharax alburnus* (Günther),
Habitat: Marañon and La Plata Basin.

A6. *Aphyocharax eques* (Steindachner).
Habitat: Amazon.

7. *Aphyocharax stramineus* Eigenmann.
Habitat: Paraguay.

6. *Aphyocharax heteresthes* Ulrey.
Habitat: Brazil.

A7. *Aphyocharax filigerus* Cope.
Habitat: Marañon.

### Holoprion Eigenmann.

Type: *Cheirodon agassizii* Steindachner.
Range: Jatuarana and "Brazil."

1. *Holoprion maxillaris* (Ulrey).
Habitat: Brazil.

2. *Holoprion agassizii* (Steindachner).
Habitat: Jatuarana.

### Subfamily CRENUCHINÆ.

CRENUCHUS Günther.

Type: *Crenuchus spilurus* Günther.
Range that of the single species.

A1. *Crenuchus spilurus* Günther.
Habitat: Amazons and Guiana.

PŒCILOCHARAX Eigenmann.

Type: *Pœcilocharax bovallii* Eigenmann.
Range that of the single species.

1. *Pœcilocharax bovallii* Eigenmann.
Habitat: Kaieteur, Potaro River.

### Subfamily IGUANODECTINÆ.

IGUANODECTES Cope.

Type: *Iguanodectes tenuis* Cope.
Range that of the single species.

A1. *Iguanodectes tenuis* Cope.
Habitat: Ambyiacu.

### Subfamily TETRAGONOPTERINÆ.

HENOCHILUS Garman.

Type: *Henochilus wheatlandi* Garman.
Range that of the single species.

1. *Henochilus wheatlandi* Garman.
Habitat: Southeastern Brazil.

BRYCON Müller & Troschel.

*Bryconodon* Eigenmann. *Triurobrycon* Eigenmann.
Type: *Brycon falcatus* Müller & Troschel.
Range: La Plata to Guatemala in all streams; western Peru, Ecuador and Panama.

(CHALCINOPSIS Kner.)
(Type: *Chalcinopsis striatulus* Kner.)

A1. *Brycon striatulus* (Kner).
*Chalcinopsis chagrensis* Kner.
Habitat: Ecuador to Panama.

2. *Brycon guatemalensis* Regan.
Habitat: Central America.

3. *Brycon rubricauda* Steindachner.
Habitat: Cauca.

4. **Brycon alburnus** (Günther).
Habitat: Western Ecuador.

5. **Brycon dentex** Günther.
Habitat: Western Ecuador to Guatemala.

(MEGALOBRYCON Günther.)
(Type: *Megalobrycon cephalus* Günther.)

6. *Brycon microlepis* Perugia.
Habitat: Upper Paraguay Basin.

A7. *Brycon cephalus* (Günther).
Habitat: Peruvian Amazon.

A8. *Brycon erythropterus* (Cope).
Habitat: Ambyiacu.

9. *Brycon ferox* Steindachner.
Habitat: Rio Mucuri.

A10. *Brycon melanopterus* (Cope).
Habitat: Amazons.

11. *Brycon devillei* (Castelnau).
*Brycon insignis* Steindachner.
Habitat: Southeastern Brazil.

(BRYCON Müller & Troschel.)

A12. *Brycon hilarii* (Cuvier & Valenciennes).
Habitat: Salinas; Paraguay; Rio San Francisco; Amazon.

13. *Brycon carpophagus* (Cuvier & Valenciennes).
Habitat: Minas Geraes.

14. *Brycon lineatus* Steindachner.
Habitat: La Plata.

A15. *Brycon stübelli* Steindachner.
Habitat: Amazons.

A16. *Brycon brevicaudus* Günther.
Habitat: Amazon Basin.

17. *Brycon nattereri* Günther.
*Chalceus opalinus* Kner.
Habitat: Upper Parana Basin.

18. *Brycon reinhardti* Lütken.
Habitat: Southeastern Brazil.

A19. *Brycon capito* Cope.
Habitat: Ambyiacu.

20. *Brycon longiceps* Steindachner.
Habitat: Orinoco.

21. *Brycon schomburgkii* Müller & Troschel.
Habitat: Essequibo.

22. **Brycon atricaudatus** (Kner).
*Brycon moorei* Steindachner.
Habitat: Magdalena and Western Ecuador.

23. *Brycon bahiensis* Günther.
Habitat: Bahia.

A24. *Brycon stolzmanni* Steindachner.
Habitat: Peru.

25. *Brycon opalinus* (Cuvier).
*Characinus amazonicus* Agassiz.
Habitat: Brazil.

26. *Brycon falcatus* Müller & Troschel.
Habitat: Guianas.

27. *Brycon orbignianus* (Cuvier & Valenciennes).
*Chalceus rhodopterus* Cuvier & Valenciennes; *Brycon orthotænia* Günther.
Habitat: La Plata Basin.

28. *Brycon lundii* Lütken.
Habitat: Rio das Velhas.

### OTHONOPHANES Eigenmann.

Type: *Brycon labiatus* Steindachner.
Range that of the single species.

1. *Othonophanes labiatus* (Steindachner).
Habitat: Cauca.

### HOLOBRYCON Eigenmann.

Type: *Brycon pesu* Müller & Troschel.
Range that of the single species.

A1. *Holobrycon pesu* (Müller & Troschel).
Habitat: Guiana; Amazons.

### SCISSOR Günther.

Type: *Scissor macrocephalus* Günther.
Range that of the single species.

1. *Scissor macrocephalus* Günther.
Habitat: Surinam.

### PHENACOGASTER Eigenmann.

Type: *Tetragonopterus pectinatus* Cope.
Range: Amazons and Guiana.

A1. *Phenacogaster pectinatus* (Cope).
Habitat: Ecuador.

A2. *Phenacogaster bairdii* (Steindachner).
*Astyanax tabatingæ* Steindachner.
Habitat: Tabatinga.

3. *Phenacogaster megalostictus* Eigenmann.
Habitat: British Guiana.

4. *Phenacogaster microstictus* Eigenmann.
Habitat: British Guiana.

### DEUTERODON Eigenmann.

*Joinvillea* Steindachner.
Type: *Deuterodon iguape* Eigenmann.
Range South Eastern Brazil to Nicaragua.

1. *Deuterodon iguape* Eigenmann.
Habitat: Rio Iguape, Santa Catharina.

2. *Deuterodon parahybæ* Eigenmann.
Habitat: Parahyba.

3. *Deuterodon pedri* Eigenmann.
Habitat: Santa Cruz.

4. *Deuterodon depressirostris* (Ribeiro).
*Joinvillea rosæ* Steindachner.
Habitat: Joinville, Santa Catharina, Brazil.

5. *Deuterodon nasutus* Meek.
Habitat: Nicaragua.

6. *Deuterodon pinnatus* Eigenmann.
Habitat: Essequibo Basin.

7. *Deuterodon potaroënsis* Eigenmann.
Habitat: Potaro River.

### HEMIBRYCON Günther.

Type: *Hemibrycon polyodon* Günther.
Range: Peru; Ecuador; Trinidad.

1. *Hemibrycon guppii* (Regan).
Habitat: Trinidad.

2. *Hemibrycon tæniurus* (Gill).
Habitat: Trinidad.

A3. *Hemibrycon jelskii* (Steindachner).
Habitat: Peru.

4. **Hemibrycon polyodon** Günther.
*Hemibrycon huambonicus* (Steindachner).
Habitat: Western Ecuador and Peru.

A5. *Hemibrycon ipanguianus* (Cope).
Habitat: Ucayale.

### PSEUDOCHALCEUS Kner.

Type: *Pseudochalceus lineatus* Kner.
Range: Western Ecuador and Rio Grande do Sul.

1. **Pseudochalceus lineatus** Kner.
Habitat: Western slopes of Ecuador.

### HOLLANDICHTHYS Eigenmann.

Type: *Tetragonopterus multifasciatus* E. & N.

1. *Hollandichthys multifasciatus* (Eigenmann & Norris).
*Pseudochalceus perstriatus* Ribeiro; *Pseudochalceus affinis* Steindachner.
Habitat: Cubatao.

### ASTYANAX Baird & Girard.

*Pœcilurichthys* Gill.
Type: *Astyanax argentatus* Baird & Girard.
Range: All streams of the eastern slope of South America north of Buenos Aires. Pacific slope of Central America and Mexico.

### (PŒCILURICHTHYS Gill).

(Type: *P. brevoortii* Gill).

1. *Astyanax polylepis* (Günther).
Habitat: Guiana.

2. *Astyanax erythropterus* (Holmberg).
Habitat: La Plata Basin.

3. *Astyanax pellegrini* Eigenmann.
Habitat: Paraguay.

4. *Astyanax correntinus* (Holmberg).
Habitat: Parana.

A5. *Astyanax riveti* Pellegrin.
Habitat: Rio Pove, Ecuador.

6. **Astyanax festæ** (Boulenger).
Habitat: Western Ecuador.

A7. *Astyanax brevirostris* (Günther).
*Tetragonopterus branckii* Steindachner.
Habitat: Ecuador and Peru.

A8. *Astyanax asymmetricus* Eigenmann.
Habitat: Tabatinga.

A9. *Astyanax symmetricus* Eigenmann.
Habitat: Tabatinga.

A10. *Astyanax zonatus* Eigenmann.
Habitat: Tabatinga.

11. *Astyanax cordovæ* (Günther).
Habitat: Argentina.

A12. *Astyanax anterior* Eigenmann.
Habitat: Tabatinga.

A13. *Astyanax bourgeti* Eigenmann.
Habitat: Tabatinga.

14. *Astyanax abramoides* Eigenmann.
Habitat: Guiana.

A15. *Astyanax abramis* (Jenyns).
Habitat: Orinoco to La Plata.

A16. *Astyanax bimaculatus* (Linnæus).
*Albula maculata* Linnæus; *Tetragonopterus linnœi, orbignianus, gronovii* Cuvier & Valenciennes; *Pœcilurichthys brevoortii* Gill; *T. bartlettii* Günther; *T. orientalis* Cope; *T. microstoma* Hensel; *T. obscurus* Hensel; *T. caudimaculatus* Cope, and *? jacuhiensis* Cope.
Habitat: All streams from the Rio Bayano south to the La Plata and east of the Andes.

17. *Astyanax bimaculatus borealis* Eigenmann
Habitat: Magdalena Basin.

A18. *Astyanax bimaculatus paraguayensis* Eigenmann.
Habitat: Paraguay and Goyaz.

19. *Astyanax bimaculatus lacustris* Lütken.
Habitat: Rio San Francisco.

20. *Astyanax bimaculatus vittatus* Castelnau.
*? T. bahiensis* Steindachner.
Habitat: Bahia.

21. *Astyanax janeiroensis* Eigenmann.
Habitat: Rio de Janeiro.

A22. *Astyanax goyazensis* Eigenmann.
Habitat: Goyaz.

A23. *Astyanax longior* Cope.
Habitat: Marañon.

24. *Astyanax orthodus* Eigenmann.
Habitat: Truando.

25. *Astyanax potaroënsis* Eigenmann.
Habitat: Potaro River.

26. *Astyanax mucronatus* Eigenmann.
Habitat: Potaro River.

A27. *Astyanax stilbe* (Cope).
Habitat: Para.

28. *Astyanax caucanus* (Steindachner).
Habitat: Cauca.

29. *Astyanax atratoënsis* Eigenmann.
Habitat: Truando.

30. *Astyanax wappi* (Cuvier & Valenciennes).
Habitat: British Guiana.

### (ASTYANAX Baird & Girard).

31. *Astyanax lineatus* (Perugia).
Habitat: Paraguay.

32. *Astyanax brevirhinus* Eigenmann.
Habitat: Jequitinhonha.

33. *Astyanax giton* Eigenmann.
Habitat: Parahyba.

A34. *Astyanax maximus* (Steindachner).
*Tetragonopterus alosa* Günther.
Habitat: Peru.

35. *Astyanax regani* Meek.
Habitat: Costa Rica.

36. *Astyanax globiceps* Meek.
Habitat: Costa Rica.

37. *Astyanax albeolus* Eigenmann.
Habitat: Costa Rica.

A38. *Astyanax fasciatus* (Cuvier).
*Tetragonopterus rutilus* Jenyns; *? T. viejita* Cuv. & Val.; *T. microstoma* Günther; *Astyanax carolinæ* Gill; *T. cuvieri; T. œrstedii* Lütken; *T. copei* Ulrey.
Habitat: Mexico to Patagonia. Apparently absent at Panama where it is replaced by *fischeri*.

39. *Astyanax fasciatus macrophthalmus* Regan.
Habitat: Mexico.

40. *Astyanax fasciatus jequitinhonhæ* Steindachner.
Habitat: Rio Jequitinhonha.

41. *Astyanax fasciatus nicaraguensis* Eigenmann & Ogle.
Habitat: Nicaragua.

42. *Astyanax fasciatus parahybæ* Eigenmann.
Habitat: Parahyba.

43. *Astyanax fasciatus æneus* (Günther).
*T. panamensis, brevimanus and humilis* Günther; *T. finitimus, belizianus, cobanensis* and *oaxacanensis* Bocourt.
Habitat: Mexico and Central America.

44. *Astyanax angustifrons* Regan.
Habitat: Mexico.

45. *Astyanax scabripinnis* (Jenyns).
*T. jenynsii* Steindachner; *A. microcephalus* Ribeiro.
Habitat: Parahyba to Santa Catharina.

46. *Astyanax scabripinnis laticeps* (Cope).
Habitat: Rio Grande do Sul.

47. *Astyanax scabripinnis rivularis* (Lütken).
Habitat: Rio San Francisco.

48. *Astyanax scabripinnis longirostris* Steindachner.
Habitat: Cubatao.

49. *Astyanax scabripinnis intermedius* Eigenmann.

Habitat: Rio Parahyba and Santa Clara.

50. *Astyanax tæniatus* (Jenyns).
*Tetragonopterus fasciatus* Steindachner and recent authors.
Habitat: Parahyba and northward.

51. *Astyanax eigenmanniorum* (Cope).
Habitat: São Paulo to Rio Primero.

52. *Astyanax mexicanus* (Philippi).
*Astyanax argentatus* Baird & Girard; *Tetragonopterus brevimanus* and *petenensis* Günther; *T. nitidus* and *fulgens* Bocourt; *T. streetsi* Cope.
Habitat: Rio Grande south to Central America.

53. *Astyanax fischeri* (Steindachner).
*A. panamensis* Steindachner, *non* Günther.
Habitat: Panama.

54. *Astyanax rubropictus* (Berg).
Habitat: Argentina, Territorio de los Andes.

A55. *Astyanax multidens* Eigenmann.
Habitat: Obidos.

56. *Astyanax mutator* Eigenmann.
Habitat: Upper Potaro.

A57. *Astyanax gracilior* Eigenmann.
Habitat: Villa Bella to Obidos.

A58. *Astyanax paucidens* Ulrey.
Habitat: Lower Amazon and tributaries.

59. *Astyanax guianensis* Eigenmann.
Habitat: British Guiana.

60. *Astyanax essequibensis* Eigenmann.
Habitat: British Guiana.

### BRYCONAMERICUS Eigenmann.

Type: *Bryconamericus exodon* Eigenmann.

Range: La Plata to Rio Grande do Sul and to western Peru and Costa Rica.

1. *Bryconamericus exodon* Eigenmann.
Habitat: Rio Paraguay.

A2. *Bryconamericus heteresthes* Eigenmann.
Habitat: Tapajos.

3. *Bryconamericus stramineus* Eigenmann MS.
Habitat: Paracicaba and Rio Uruguay.

A4. *Bryconamericus mœnkhausii* (Eigenmann & Kennedy).
Habitat: Paraguay and Tabatinga.

5. *Bryconamericus boops* Eigenmann.
Habitat: Maldonado.

A6. *Bryconamericus phœnicopterus* (Cope).
Habitat: Ambyiacu.

7. *Bryconamericus alburnus* (Hensel).
Habitat: Rio Cadea.

A8. *Bryconamericus astictus* (Ulrey).
Habitat: Brazil.

A9. *Bryconamericus diaphanus* (Cope).
Habitat: Marañon Basin.

A10. *Bryconamericus breviceps* Eigenmann.
Habitat: Goyaz.

11. *Bryconamericus chapadæ* (Fowler).
Habitat: Paraguay Basin.

12. *Bryconamericus peruanus* (Müller & Troschel).
*Tetragonopterus microphthalmus* and *petenensis* Günther, in part; *T. simus* Boulenger.

13. *Bryconamericus scleroparius* (Regan).
Habitat: Costa Rica.

14. *Bryconamericus eigenmanni* (Evermann & Kendall).
Habitat: Cordoba, Argentina.

15. *Bryconamericus iheringii* (Boulenger).
*Tetragonopterus pliodus* Cope.
Habitat: Rio Grande do Sul and La Plata Basin.

16. *Bryconamericus emperador* (Eigenmann & Ogle).
Habitat: Panama.

17. *Bryconamericus hyphessus* Eigenmann.
Habitat: British Guiana.

### PIABINA Reinhardt.

Type: *Piabina argenteus* Reinhardt.

Range: South Eastern Brazil.

1. *Piabina piquira* Eigenmann.

Habitat: Piracicaba.

2. *Piabina argentea* Reinhardt.
Habitat: Rio das Velhas Basin.

### CREAGRUTUS Günther.

Type: *Leporinus mülleri* Günther.
Range: Peru to Caranca, on both slopes; Guiana.

A1. *Creagrutus peruanus* (Steindachner).
*Creagrutus nasutus* Günther.
Habitat: Peru.

A2. **Creagrutus mülleri** (Günther).
*Creagrutus affinis* Steindachner.
Habitat: Cauca and Ecuador.

3. *Creagrutus melanzonus* Eigenmann.
Habitat: Essequibo Basin.

### ASTYANACINUS Eigenmann.

Type: *Tetragonopterus moorii* Boulenger.
Range that of the single species.

1. *Astyanacinus moorii* (Boulenger).
Habitat: Paraguay Basin.

### CREATOCHANES Günther.

Type: *Salmo melanurus* Bloch.
Range: Guianas to Amazons.

A1. *Creatochanes melanurus* (Bloch).
Habitat: Guianas to Amazons.

2. *Creatochanes affinis* Günther.
Habitat: British and French Guiana.

3. *Creatochanes caudomaculatus* Günther.
Habitat: South America.

A4. *Creatochanes gracilis* Eigenmann.
Habitat: Tabajos.

### BRYCOCHANDUS Eigenmann.

Type: *Brycochandus durbini* Eigenmann.
Range that of the single species.

A1. *Brycochandus durbini* Eigenmann.
Habitat: Rio Tapajos.

### BRYCONOPS Kner.

Type: *Bryconops alburnoides* Kner.
Range: Rio Branco to Rio Guapore.

A1. *Bryconops alburnoides* Kner.
*Bryconops alburnus* Kner.
Habitat: Rio Guaporé.

A2. *Bryconops lucidus* Kner.
Habitat: Rio Branco.

### CTENOBRYCON Eigenmann.

Type: *Tetragonopterus hauxwellianus* Cope.
Range: Amazons.

A1. *Ctenobrycon hauxwellianus* (Cope).
*Tetragonopterus gibbicervix* Pellegrin.
Habitat: Amazons; Paraguay.

A2. *Ctenobrycon multifasciatus* (Steindachner).
Habitat: Amazon.

3. *Ctenobrycon spilurus* (Cuvier & Valenciennes).
Habitat: Guianas.

4. *Ctenobrycon alleni* (Eigenmann & McAtee).
Habitat: Paraguay.

### PSELLOGRAMMUS Eigenmann.

Type: *Hemigrammus kennedyi* Eigenmann.
Range that of the single species.

1. *Psellogrammus kennedyi* (Eigenmann).
Habitat: Paraguay Basin.

### HEMIGRAMMUS Gill.

*Holopristis* Eigenmann.
Type: *Pœcilurichthys* (*Hemigrammus*) *unilineatus* Gill.
Range: Paraguay Basin; Rio Grande do Sul; Rio San Francisco Basin; Amazon and Trinidad.

1. *Hemigrammus nanus* (Reinhardt).
Habitat: San Francisco Basin.

2. *Hemigrammus ulreyi* (Boulenger).
Habitat: Paraguay Basin.

A3. *Hemigrammus cœruleus* Durbin.
Habitat: Manacapuru.

4. *Hemigrammus erythrozonus* Durbin.
Habitat: Erukin in British Guiana.

A5. *Hemigrammus levis* Durbin.
Habitat: Amazon.

A6. *Hemigrammus hyanuary* Durbin MS.
Habitat: Lake Hyanuary.

7. *Hemigrammus rodwayi* Durbin.
Habitat: British Guiana near the coast.

8. *Hemigrammus tridens* Eigenmann.
Habitat: Arroyo Pypucu, Paraguay.

9. *Hemigrammus iota* Durbin.
Habitat: Rockstone and Gluck Island, British Guiana.

10. *Hemigrammus analis* Durbin.
Habitat: Gluck Island, Wismar, British Guiana.

A11. *Hemigrammus lunatus* Durbin MS.
Habitat: Amazon.

A12. *Hemigrammus microstomus* Durbin MS.
Habitat: Amazon.

13. *Hemigrammus orthus* Durbin.
Habitat: Tukeit and Gluck Island, British Guiana.

A14. *Hemigrammus cupreus* Durbin MS.
Habitat: Jatuarana, Lake Saraca.

15. *Hemigrammus cylindricus* Durbin.
Habitat: Tumatumari, Crab Falls, Rockstone and Gluck Island, British Guiana.

A16. *Hemigrammus unilineatus* Gill.
Habitat: Trinidad; Orinoco; Para.

A17. *Hemigrammus elegans* (Steindachner).
Habitat: Amazon.

18. *Hemigrammus micropterus* Meek.
Habitat: Orinoco.

A19. *Hemigrammus schmardæ* Steindachner.
Habitat: Amazons.

20. *Hemigrammus boulengeri* Eigenmann.
Habitat: Rio Grande do Sul.

21. *Hemigrammus ocellifer* Steindachner.
Habitat: Amazons.

22. *Hemigrammus matei* Eigenmann.
Habitat: Argentina.

### HYPHESSOBRYCON Durbin.

Type: *Hemigrammus compressus* Meek.
Range: Mexico to Paraguay and Rio San Francisco.

1. *Hyphessobrycon callistus* (Boulenger).
Habitat: Matto Grosso.

A2. *Hyphessobrycon gracilis* (Reinhardt).
Habitat: San Francisco and Paraguay Basins; Amazon.

A3. *Hyphessobrycon riddlei* Meek.
Habitat: Lower Amazon.

A4. *Hyphessobrycon bellottii* (Steindachner).
Habitat: Amazons; Orinoco.

5. *Hyphessobrycon anisitsi* Eigenmann.
Habitat: Paraguay.

6. *Hyphessobrycon milleri* Durbin.
Habitat: Las Amates, Guatemala.

7. *Hyphessobrycon minor* Durbin.
Habitat: Konawaruk, British Guiana.

A8. *Hyphessobrycon serpæ* Durbin.
Habitat: Serpa.

A9. *Hyphessobrycon copelandi* Durbin.
Habitat: Tabatinga.

A10. *Hyphessobrycon bentosi* Durbin.
Habitat: Obidos.

11. *Hyphessobrycon rosaceus* Durbin.
Habitat: Gluck Island and Rockstone, British Guiana.

12. *Hyphessobrycon panamensis* Durbin.
Habitat: Panama.

A13. *Hyphessobrycon stramineus* Durbin MS.
Habitat: Tabatinga.

14. *Hyphessobrycon minimus* Durbin.
Habitat: Cane Grove Corner, British Guiana.

A15. *Hyphessobrycon melanzonatus* Durbin.
Habitat: Amazon.

16. *Hyphessobrycon eos* Durbin.
    Habitat: Kangaruma, British Guiana.
17. *Hyphessobrycon stictus* Durbin.
    Habitat: British Guiana near the coast.
18. *Hyphessobrycon lütkeni* (Boulenger).
    Habitat: Paraguay and Rio Grande do Sul.
19. *Hyphessobrycon santæ* (Eigenmann).
    *Tetr. interrupta* Lütken, *non* Jenyns.
    Habitat: Rio San Francisco.

A20. *Hyphessobrycon inconstans* (Eigenmann & Ogle).
    Habitat: Para.

A21. *Hyphessobrycon heterorhabdus* (Ulrey).
    Habitat: Para.

A22. *Hyphessobrycon robustulus* (Cope).
    Habitat: Peruvian Amazon.

23. *Hyphessobrcon compressus* Meek.
    Habitat: Papaloapam Basin, Mexico.

### DERMATOCHEIR Durbin.

Type: *Dermatocheir catablepta* Durbin.
Range that of the single species.

1. *Dermatocheir catablepta* Durbin, 1909, 55.
    Habitat: Tumatumari, British Guiana.

### PRISTELLA Eigenmann.

Type: *Holopristis riddlei* Meek.
Range: Orinoco and Guiana.

1. *Pristella riddlei* (Meek).
    Habitat: Orinoco and British Guiana.
2. *Pristella aubynei* Eigenmann.
    Habitat: Mahaica Basin, British Guiana.

### THAYERIA Eigenmann.

Type: *Thayeria obliqua* Eigenmann.
Range that of the single species.

A1. *Thayeria obliqua* Eigenmann.
    Habitat: Amazon.

### GYMNOCORYMBUS Eigenmann.

Type: *Gymnocorymbus thayeri* Eigenmann.
Range: Amazons; Paraguay.

A1. *Gymnocorymbus thayeri* Eigenmann.
    Habitat: Amazon and Solimoens.

2. *Gymnocorymbus ternetzi* (Boulenger).
    Habitat: Paraguay.

### MŒNKHAUSIA Eigenmann.

Type: *Tetragonopterus xinguensis* Steindachner.
Range: Amazons and Paraguay.

A1. *Mœnkhausia steindachneri* Eigenmann.
    *Tetragonopterus lineatus* Steindachner (*non* Perugia).
    Habitat: Iquitos.

A2. *Mœnkhausia latissima* Eigenmann.
    Habitat: Tabatinga.

A3. *Mœnkhausia jamesi* Eigenmann.
    Habitat: Obidos and Iça.

A4. *Mœnkhausia justæ* Eigenmann.
    Habitat: Amazon?

5. *Mœnkhausia doceana* (Steindachner).
    Habitat: Eastern Brazil.
6. *Mœnkhausia chrysargyrea* (Günther).
    Habitat: Essequibo.
7. *Mœnkhausia comma* Eigenmann.
    Habitat: Cudajas.

A8. *Mœnkhausia melogramma* Eigenmann.
    Habitat: Tabatinga.

A9. *Mœnkhausia oligolepis* (Günther).
    *Tetragonopterus agassizii* Steindachner.
    Habitat: Amazons to Guiana.

A10. *Mœnkhausia atahualpiana* (Fowler).
    Habitat: Pebas.

11. *Mœnkhausia australis* Eigenmann.
    Habitat: Paraguay.

A12. *Mœnkhausia grandisquamis* (Müller & Troschel).
    Habitat: Surinam; Amazons.

13. *Mœnkhausia ovalis* (Günther).
    Habitat: Guiana.

A14. *Mœnkhausia barbouri* Eigenmann.

Habitat: Villa Bella.

A15. *Mœnkhausia xinguensis* (Steindachner).
Habitat: Xingu.

A16. *Mœnkhausia megalops* Eigenmann.
Habitat: Gurupa to Itaituba; Guiana.

A17. *Mœnkhausia dichrourus* (Kner).
Habitat: Paraguay Basin and Amazons.

A18. *Mœnkhausia dichrourus intermedia* Eigenmann.
Habitat: Tabatinga.

A19. *Mœnkhausia lepidurus* (Kner).
Habitat: Amazons to Guianas.

A20. *Mœnkhausia lepidurus lata* Eigenmann.
Habitat: Tapajos.

A21. *Mœnkhausia lepidurus icæ* Eigenmann.
Habitat: Iça.

A22. *Mœnkhausia lepidurus gracillima* Eigenmann.
Habitat: Serpa and Villa Bella.

A23. *Mœnkhausia collettii* (Steindachner).
Habitat: Amazons; Guiana.

A24. *Mœnkhausia copei* (Steindachner).
Habitat: Para to Santarem.

A25. *Mœnkhausia cotinho* Eigenmann.
Habitat: Para.

A26. *Mœnkhausia ceros* Eigenmann.
Habitat: Lake Hyanuary.

27. *Mœnkhausia browni* Eigenmann.
Habitat: Potaro River above and below the Kaieteur.

28. *Mœnkhausia shideleri* Eigenmann.
Habitat: Essequibo Basin.

### TETRAGONOPTERUS Cuvier.

Type: *Tetragonopterus argenteus* Cuvier.
Range: Orinoco and Guianas; Amazons and south to Rio Parahyba and La Plata.

A1. *Tetragonopterus argenteus* Cuvier.
*T. rufipes* Valenciennes; *T. sana* Castelnau.
Habitat: La Plata Basin to Guiana.

A2. *Tetragonopterus huberi* Steindachner.
Habitat: Rio Purus.

A3. *Tetragonopterus chalceus* Agassiz.
*T. artedii* and *schomburgkii* Cuvier & Valenciennes; *T. ortoni* Gill.
Habitat: Amazons and Guiana.

4. *Tetragonopterus gibbosus* Steindachner.
Habitat: Parahyba.

### MARKIANA Eigenmann.

Type: *Tetragonopterus nigripinnis* Perugia.
Range La Plata and Orinoco.

1. *Markiana nigripinnis* (Perugia).
*Tetragonopterus anomalus* Steindachner.
Habitat: La Plata Basin.

2. *Markiana geayi* Pellegrin.
Habitat: Apuré, Venezuela.

## Subfamily DIAPOMINÆ.

### DIAPOMA Cope.

Type: *Diapoma speculiferum* Cope.
Range that of the single species.

1. *Diapoma speculiferum* Cope.
Habitat: Rio Grande do Sul.

## Subfamily STEVARDIINÆ.

### STEVARDIA Gill.

*Corynopoma* and *Nematopoma* Gill.
Type: *Stevardia albipinnis* Gill.
Range that of the single species.

1. *Stevardia albipinnis* Gill.
*Corynopoma riisei* and *veedonii* Gill; *Nematopoma searlsii* Gill.
Habitat: Trinidad.

## Subfamily PIABUCININÆ.

### PIABUCINA Cuvier & Valenciennes.

Type: *Piabucina erythrinoides* Cuvier & Valenciennes.

Range: Panama to British Guiana and Ecuador.

A1. *Piabucina unitæniata* Günther.
Habitat: Ecuador and British Guiana.

2. *Piabucina festæ* Boulenger.
Habitat: Panama.

3. *Piabucina panamensis* Gill.
Habitat: Panama.

4. *Piabucina erythrinoides* Cuvier & Valenciennes.

5. *Piabucina pleurotænia* Regan.
Habitat: Venezuela.

6. **Piabucina astrigata** Regan.
Habitat: Western slope of Ecuador.

A7. *Piabucina elongata* Boulenger.
Habitat: Eastern slope of Ecuador.

### CHALCEUS Cuvier.

*Pellegrinina* Fowler.

Type: *Chalceus macrolepidotus* Cuvier.

Range that of the single species.

A1. *Chalceus macrolepidotus* Cuvier.
*Chalceus ararapeera* Cuvier & Valenciennes; *P. heterolepis* Fowler.
Habitat: Guiana.

### PLETHODECTES Cope.

Type: *Plethodectes erythrurus* Cope.

Range that of the single species.

A1. *Plethodectes erythrurus* Cope.
Habitat: Peru.

## Subfamily LEBIASININÆ.

### LEBIASINA Cuvier & Valenciennes.

Type: *Lebiasina bimaculata* Cuvier & Valenciennes.

Range: Streams of western slopes of Perü and Ecuador.

1. **Lebiasina bimaculata** Cuvier & Valenciennes.
Habitat: Western slopes of Peru and Ecuador.

### PHOXINOPSIS Regan.

Type: *Phoxinopsis typicus* Regan.

Range that of the single species.

1. *Phoxinopsis typicus* Regan,
Regan, 1907*b*, 262.
Habitat: Argentina.

## Subfamily GASTEROPELECINÆ.

### GASTEROPELECUS Gronow.

Type: *Clupea sternicla* Linnæus.

Range: Amazons.

A1. *Gasteropelecus sternicla* (Linnæus).
*Salmo gasteropelecus* Pallas.
Habitat: Amazons.

### CARNEGIELLA Eigenmann.

Type: *Gasteropelecus strigatus* Günther.

Range that of the single species.

A1. *Carnegiella strigata* (Günther).
*Gasteropelecus fasciatus* Garman.
Habitat: Amazons and Guiana.

### PTERODISCUS Eigenmann.

Type: *Pterodiscus levis* Eigenmann.

Range that of the single species.

A1. *Pterodiscus levis* Eigenmann.
Habitat: Para.

### THORACOCHARAX Fowler.

Type: *Gasteropelecus stellatus* Kner.

Range: Panama to Paraguay.

A1. *Thoracocharax stellatus* (Kner).
? *Gasteropelecus securis* Philippi.
Habitat: Amazons; Paraguay; Orinoco.

A2. *Thoracocharax pectorosus* (Garman).
Habitat: Amazons.

4. *Thoracocharax maculatus* (Steindachner).
Habitat: Panama.

CHALCINUS Cuvier & Valenciennes.

*Triportheus* Cope.
Type: *Chalcinus brachypomus* Cuvier & Valenciennes = *Chalceus angulatus* Agassiz.
Range: Magdalena to Guiana and south to Rio San Francisco on the east, and the La Plata Basin on the west.

1. *Chalcinus pictus* Garman.
Habitat: Jutahy.

2. *Chalcinus paranensis* Günther.
Habitat: Parana and Paraguay rivers

A3. *Chalcinus angulatus* Spix.
*Chalcinus brachypomus* Cuvier & Valenciennes; *Chalcinus mülleri* Philippi; *Chalcinus trifurcatus* Castelnau; *Chalcinus nematurus* Kner; *Triportheus flavus* Cope.
Habitat: Orinoco; Amazons; Paraguay.

A4. *Chalcinus angulatus curtus* Garman.
Habitat: Paraguay; Amazon.

A5. *Chalcinus angulatus vittatus* Garman.
Habitat: Amazon.

6. *Chalcinus angulatus signatus* Garman.
Habitat: Rio Puty.

A7. *Chalcinus angulatus fuscus* Garman.
Habitat: Amazon.

A8. *Chalcinus güntheri* Garman.
*Chalceus rotundatus* Schomburgk; *Chalcinus brachypomus* Günther (*non* Cuvier & Valenciennes).
Habitat: Guianas; Amazon; San Francisco.

A9. *Chalcinus albus* (Cope).
*Chalcinus knerii* Steindachner.
Habitat: Amazons.

A10. *Chalcinus auritus* Cuvier & Valenciennes.
Habitat: Araguay.

A11. *Chalcinus elongatus* Günther.
Habitat: Orinoco; Amazons.

12. *Chalcinus magdalenæ* Steindachner.
Habitat: Magdalena Basin.

COSCINOXYRON Fowler.

Type: *Chalcinus culter* Cope.
Range that of the single species.

A1. *Coscinoxyron culter* (Cope).
Habitat: São Paulo on the Amazon.

PSEUDOCORYNOPOMA Perugia.

*Bergia* Steindachner, *Chalcinopelecus* Holmberg.
Type: *Pseudocorynopoma doriæ* Perugia.
Range that of the single species.

1. *Pseudocorynopoma doriæ* Perugia.
*Bergia altipinnis* Steindachner; *Chalcinopelecus argentinus* Holmberg.
Habitat: La Plata Basin.

## Subfamily AGONIATINÆ.

AGONIATES Müller & Troschel.

Type: *Agoniates halecinus* Müller & Troschel.
Range that of the single species.

1. *Agoniates halecinus* Müller & Troschel.
Habitat: Guiana.

PIABUCUS Oken.

Type: *Salmo argentinus* Linnæus = *Piabucus dentatus* Kœlreuter.
Range: Guiana; Amazons; La Plata.

A1. *Piabucus spilurus* Günther.
Habitat: Amazons.

A2. *Piabucus dentatus* Kœlreuter.
*Salmo argentinus* Linnæus.
Habitat: Guianas; Iquitos.

3. *Piabucus melanostomus* Holmberg.
Habitat: La Plata Basin.

A4. *Piabucus purusii* Steindachner.
Habitat: Rio Purus.

PARAGONIATES Steindachner.

Type: *Paragoniates alburnus* Steindachner.

Range: Amazons and southeastern Brazil.

A1. *Paragoniates alburnus* Steindachner.
Habitat: Solimoens and Marañon.

A2. *Paragoniates mülleri* Steindachner.
Habitat: Obidos.

3. *Paragoniates microlepis* Steindachner.
Habitat: Southeastern Brazil.

LEPTAGONIATES Boulenger.

Type: *Leptagoniates steindachneri* Boulenger.

Range that of the single species.

A1. *Leptagoniates steindachneri* Boulenger.
Habitat: Sarayacu, Peru.

## Subfamily STICHANODONTINÆ.

STICHANODON Eigenmann.

Type: *Lütkenia insignis* Steindachner.

Range that of the single species.

A1. *Stichanodon insignis* Steindachner.
Habitat: Amazon.

## Subfamily STETHAPRIONINÆ.

POPTELLA Eigenmann.

Type: *Tetragonopterus longipinnis* Popta.

Range that of the single species.

1. *Poptella longipinnis* (Popta).
Habitat: Dutch Guiana.

STETHAPRION Cope.

Type: *Stethaprion erythrops* Cope.

Range: Amazons and Santa Cruz.

A1. *Stethaprion erythrops* Cope.
Habitat: Amazons.

A2. *Stethaprion chryseum* Cope.
Habitat: Marañon.

FOWLERINA Eigenmann.

Type: *Tetragonopterus compressus* Günther.

Range: Paraguay to British Guiana and eastern Brazil.

A1. *Fowlerina orbicularis* (Cuvier & Valenciennes).
*Tetragonopterus compressus* Günther.
Habitat: Amazons and Guiana.

2. *Fowlerina paraguayensis* Eigenmann.
Habitat: Paraguay; Eastern Brazil.

BRACHYCHALCINUS Boulenger.

Type: *Brachychalcinus retrospina* Boulenger.

Range Upper Amazon; Paraguay.

A1. *Brachychalcinus copei* Steindachner.
Habitat: Tabatinga.

2. *Brachychalcinus retrospina* Boulenger.
Habitat: Santa Cruz; Descalvados.

## Subfamily SERRASALMONINÆ.

PYGOPRISTIS Müller & Troschel.

Type: *Pygopristis fumarius* Müller & Troschel=*Serrasalmo denticulatus* Cuvier.

Range: Paraguay to Guiana.

A1. *Pygopristis denticulatus* (Cuvier).
*Pygopristis fumarius* Müller & Troschel; *Serrasalmo punctatus* Schomburgk.
Habitat: Guianas to Amazon.

2. *Pygopristis serrulatus* (Cuvier & Valenciennes).
Habitat: Matto Grosso and Paraguay.

### PYGOCENTRUS Müller & Troschel.

Type: *Serrasalmo piraya* Cuvier.

Range: Orinoco to La Plata and Rio das Velhas; not in coastwise streams of southeastern Brazil.

1. *Pygocentrus niger* (Schomburgk).
Habitat: Upper courses of all streams of Guiana.

A2. *Pygocentrus piraya* (Cuvier).
*Serrasalmo paranha* Agassiz; ? *Serrasalmo nigricans* Agassiz; *Pygocentrus bidorsalis* Natterer.
Habitat: Guiana; Amazon to Rio das Velhas and Paraguay.

3. *Pygocentrus notatus* (Lütken).
Habitat: Venezuela.

A4. *Pygocentrus scapularis* (Günther).
Habitat: British Guiana to Para.

A5. *Pygocentrus altus* Gill.
Habitat: Marañon.

A?6. *Pygocentrus nattereri* (Kner).
Habitat: La Plata Basin; ? Orinoco.

7. *Pygocentrus bilineatus* Eigenmann.
Habitat: North Western Guiana.

8. *Pygocentrus ternetzi* Steindachner.
Habitat: Rio Paraguay.

A9. *Pygocentrus calmoni* Steindachner.
Habitat: Rio Para.

A10. *Pygocentrus striolatus* Steindachner.
Habitat: Para.

### SERRASALMO Lacépède.

Type: *Salmo rhombeus* Linnæus.

Range: Orinoco to Guianas, south to the Rio das Velhas and Paraguay and Bolivia.

A1. *Serrasalmo elongatus* Kner.
Habitat: Rios Guaporé and Huallaga.

A2. *Serrasalmo gibbus* Castelnau.
Habitat: Araguay.

A3. *Serrasalmo marginatus* Valenciennes.
*Serrasalmo humeralis* Castelnau, not of Cuvier & Valenciennes; *Serrasalmo irritans* Peters; *Serrasalmo iridopsis* Ulrey (*non* Cope).
Habitat: La Plata Basin; Orinoco; Amazons; Rio das Velhas.

4. *Serrasalmo brandtii* Lütken.
Habitat: Rio San Francisco.

A5. *Serrasalmo gymnogenys* Günther.
Habitat: Amazon and Paraguay.

A6. *Serrasalmo iridopsis* Cope.
Habitat: Ambyiacu.

A7. *Serrasalmo æsopus* Cope.
Habitat: Solimoens and Marañon.

A8. *Serrasalmo maculatus* Kner.
*Pygocentrus melanurus* Heckel; *Pygocentrus nigricans* Heckel.
Habitat: Amazons and Bolivia.

A9. *Serrasalmo spilopleura* Kner.
? *Serrasalmo aureus* Agassiz; *Pygocentrus dulcis* Heckel.
Habitat: Guianas to Paraguay and Bolivia.

A10. *Serrasalmo humeralis* Cuvier & Valenciennes.
Habitat: Amazons and Paraguay.

A11. *Serrasalmo immaculatus* Cope.
Habitat: Peruvian Amazon.

A?12. *Serrasalmo rhombeus* (Linnæus).
Habitat: Guianas; Paraguay.

A13. *Serrasalmo paraënsis* Steindachner.
Habitat: Rio Para.

## Subfamily MYLINÆ.

### MYLESINUS Cuvier & Valenciennes.

Type: *Mylesinus schomburgkii* Cuvier & Valenciennes.

Range that of the single species.

1. *Mylesinus schomburgkii* Cuvier & Valenciennes.
Habitat: Guiana; Rio Vaupes.

### CATOPRION Müller & Troschel.

Type: *Serrasalmo mento* Cuvier.

Range that of the single species.

A1. *Catoprion mento* (Cuvier).

*Mylesinus macropterus* Ulrey.

Habitat: Guianas to Rio Guaporé.

### ACNODON Eigenmann.

Type: *Myletus oligocanthus* Müller & Troschel.

Range that of the single species.

A1. *Acnodon oligocanthus* (Müller & Troschel).

Habitat: Guianas and Brazil.

### PIARACTUS Eigenmann.

Type: *Myletes brachypomus* Cuvier.

Range: Orinoco to La Plata; not in coastwise streams of southeastern Brazil.

A1. *Piaractus brachypomus* (Cuvier).

? *Myletes pacu* Humboldt.

Habitat: La Plata Basin and Guaporé.

A2. *Piaractus macropomus* (Cuvier).

Habitat: Orinoco and Matto Grosso.

### METYNNIS Cope.

*Sealeina* Fowler.

Type: *Metynnis luna* Cope.

Range: Guianas to Paraguay.

A1. *Metynnis hypsauchen* (Müller & Troschel).

Habitat: Guianas; Amazons to Rio Guaporé and Paraguay.

A2. *Metynnis maculatus* (Kner).

Habitat: Guiana to Rio Parana.

A3. *Metynnis lippincottianus* (Cope).

Habitat: Para.

A4. *Metynnis luna* Cope.

*Myletes hypsauchen* Ulrey.

Habitat: Amazons.

5. *Metynnis gœldii* Eigenmann.

*Myletes lippincottianus* Ulrey (*non* Cope).

Habitat: Brazil.

6. *Metynnis mola* Eigenmann & Kennedy.

Habitat: Paraguay Basin.

7. *Metynnis unimaculatus* Steindachner.

Habitat: Rio Parnahyba.

### MYLEUS Müller & Troschel.

*Tometes* Cuv. & Val.; *Myloplus* Gill.

Type: *Myleus setiger* Müller & Troschel.

Range: Orinoco and Guianas to the Paraguay and Rio San Francisco; not in coastwise streams of southeastern Brazil.

A1. *Myleus setiger* Müller & Troschel.

*Myletes doidyxodon* Cuvier & Valenciennes; *Tometes trilobatus* Cuvier & Valenciennes; *Myletes filosus* Heckel.

Habitat: Guiana to Matto Grosso.

2. *Myleus schomburgkii* (Jardine).

*Myletes palometa* Cuvier & Valenciennes; *Myletes divaricatus* Cuvier & Valenciennes; *Myletes pacu* Schomburgk.

Habitat: Essequibo.

A3. *Myleus torquatus* (Kner).

Habitat: Rio Branco.

4. *Myleus ellipticus* (Günther).

Habitat: Essequibo.

5. *Myleus knerii* (Steindachner).

Habitat: Guiana.

A6. *Myleus discoideus* (Kner).

Habitat: Bananeira; Rio Branco; Matto Grosso.

A7. *Myleus rhomboidalis* (Cuvier).

*Tetragonopterus latus* Schomburgk.

Habitat: Guiana and Amazon.

A8. *Myleus parma* Günther.

Habitat: Amazon Basin.

9. *Myleus micans* (Lütken).

Habitat: San Francisco Basin.

10. *Myleus rubripinnis* Müller & Troschel.

Habitat: Essequibo.

11. *Myleus tiete* (Eigenmann & Norris).

Habitat: Piracicaba.

A?12. *Myleus asterias* (Müller & Troschel).

Habitat: Guianas and Paraguay.

A13. *Myleus altipinnis* Cuvier & Valenciennes.

Habitat: Rios Cipo and San Francisco.

14. *Myleus levis* Eigenmann & McAtee.

Habitat: Paraguay.

A15. *Myleus orbicularis* Steindachner.
Habitat: Santarem.
16. *Myleus orinocensis* Steindachner.
Habitat: Orinoco.

### COLOSSOMA Eigenmann.

*Waiteina* and *Reganina* Fowler.
Type: *Myletes oculus* Cope.
Range: Amazon and La Plata Basins. Not in southeastern coastwise streams.
A1. *Colossoma oculus* (Cope).
Habitat: Ambyiacu.
A2. *Colossoma nigripinnis* (Cope).
Habitat: Amazons.
3. *Colossoma mitrei* (Berg).
Habitat: Parana.
A4. *Colossoma bidens* (Agassiz).
Habitat: Amazons.
5. *Colossoma orbignyanum* (Cuvier & Valenciennes).
Habitat: La Plata Basin.
6. *Colossoma herniarium* (Cope).
Habitat: Peruvian Amazon.

### MYLOSOMA Eigenmann.

Type: *Myletes albiscopus* Cope.
Range: Guiana and Orinoco to the La Plata Basin; not in the coastwise streams of southeastern Brazil.
A1. *Mylosoma aureum* (Spix).
*Myletes auriventris* Cuvier.
Habitat: Orinoco to La Plata Basin.
A2. *Mylosoma albiscopus* (Cope).
Habitat: Ambyiacu.

## Subfamily CYNODONTINÆ.

### RHAPHIODON Agassiz.

Type: *Rhaphiodon vulpinus* Spix.
Range that of the single species.
A1. *Rhaphiodon vulpinus* Spix.
Habitat: Orinoco to La Plata.

### CYNODON Spix.

Type: *Cynodon gibbus* Spix.
Range that of the single species.
A1. *Cynodon gibbus* Spix.
Habitat: Amazon to Rio Mamore.

### HYDROLYCUS Müller & Troschel.

Type: *Hydrocyon scomberoides* Cuvier.
Range: Amazons south to the Araguay and north in the Guianas to Orinoco.
A1. *Hydrolycus scomberoides* (Cuvier).
Habitat: Orinoco and Guianas; Amazons and south to Araguay.
A2. *Hydrolycus copei* Gill.
Habitat: Marañon.
A3. *Hydrolycus pectoralis* Günther.
Habitat: Marañon.

## Subfamily CHARACINÆ.

### ASIPHONICHTHYS Cope.

Type: *Asiphonichthys stenopterus* Cope.
Range that of the single species.
1. *Asiphonichthys stenopterus* Cope.
Habitat: Jacuhy.

### CHARAX Scopoli.

*Epicyrtus* Müller & Troschel; *Anacyrtus* Günther; *Cynopotamus* C. & V.; *Cyrtocharax* Fowler.
Type: *Salmo gibbosus* Linnæus.
Range: Guiana; Amazons; Paraguay.
A1. *Charax tectifer* (Cope).
*C. sanguineus* Cope.
Habitat: Ecuador.
A2. *Charax gibbosa* (Linnæus).
*Epicyrtus macrolepis* Kner.
Habitat: Guianas; Amazons and Paraguay.
A3. *Charax pauciradiata* (Günther).
Habitat: Amazons.
A4. *Charax limæsquamis* (Cope).
Habitat: Marañon.

A5. *Charax amazonum* (Günther).
Habitat: Ecuador.

6. *Charax argentea* Valenciennes.
Habitat: La Plata and Paraguay.

7. *Charax atratoënsis* Eigenmann.
Habitat: Atrato.

8. *Charax squamosa* Eigenmann & Kennedy.
Habitat: Paraguay.

9. *Charax caliura* Eigenmann & Kennedy.
Habitat: Paraguay.

### RŒSTES Günther.

Type: *Cynoptamus molossus* Kner.
Range that of the single species.

1. *Rœstes molossus* (Kner).
Habitat: Amazons south to Paraguay.

### GILBERTOLLUS.

*Gilbertella* Eigenmann.
Type: *Anacyrtus* (*Rœstes*) *alatus* Steindachner.
Range: that of the single species.

1. *Gilbertollus alatus* (Steindachner).
Habitat: Rio Magdalena.

### BRAMOCHARAX Gill.

Type: *Bramocharax bransfordii* Gill.
Range: Central America.

1. *Bramocharax bransfordii* Gill.
Habitat: Lake Nicaragua.

2. *Bramocharax elongatus* Meek,
M., 1907, 110.
Habitat: Nicaragua.

### RŒBOIDES Günther.

Type: *Epicyrtus microlepis* Reinhardt.
Range: Panama to the Orinoco; Amazons south to the Rio das Velhas and the Paraguay.

A1. *Rœboides microlepis* (Reinhardt).
*? Epicyrtus gibbosus* Cuvier & Valenciennes (*non* Linnæus).
Habitat: Obidos; Paraguay Basin; Mamori River in Bolivia.

2. *Rœboides guatemalensis* Günther.
Habitat: Rios Chagres and Huamuchala.

A3. *Rœboides affinis* (Günther).
*Rœboides rubrivertex* Cope.
Habitat: Amazons and Orinoco.

4. *Rœboides bonariensis* Steindachner.
*Rœboides microlepis* Eigenmann & Kennedy (*non* Reinhardt).
Habitat: La Plata Basin.

A5. *Rœboides myersii* Gill.
Habitat: Amazons.

6. *Rœboides prognathus* (Boulenger).
Habitat: Paraguay Basin.

A7. *Rœboides bicornis* Cope.
Habitat: Pebas.

A8. *Rœboides xenodon* (Lütken).
Habitat: Rio das Velhas; Amazons.

9. *Rœboides dayii* Steindachner.
Habitat: Magdalena Basin.

10. *Rœboides francisci* Steindachner.
Habitat: Rio San Francisco.

### EUCYNOPOTAMUS Fowler.

Type: *Cynopotamus gulo* Cope.
Range: Magdalena; Peruvian Amazon; Araguay and La Plata Basin.

A1. *Eucynopotamus magdalenæ* (Steindachner).
Habitat: Magdalena Basin; Rio Paraguay.

A2. *Eucynopotamus humeralis* (Valenciennes).
Habitat: La Plata Basin; Goyaz.

A3. *Eucynopotamus gulo* (Cope).
Habitat: Pebas.

A4. *Eucynopotamus knerii* (Steindachner).
*Cynopotamus humeralis* Kner (*non* Valenciennes).
Habitat: La Plata Basin and Peruvian Amazon.

### EVERMANNOLUS Eigenmann.

*Evermannella,* Eigenmann.
Type: *Cynopotamus biserialis* Garman.
Range that of the single species.

A1. *Evermannolus biserialis* (Garman).
Habitat: Amazons.

### SALMINUS Agassiz.

Type: *Hydrocyon brevidens* Valenciennes = *Salminus maxillosus* Cuvier & Valenciennes.

Range: Cauca to Ecuador; Amazon to Rio San Francisco and the La Plata Basin; Rio Grande do Sul.

1. *Salminus maxillosus* Cuvier & Valenciennes.
*Hydrocyon brevidens* Valenciennes, *non* Cuvier; *Salminus brevidens* Eigenmann & Eigenmann, *non* Cuvier; *? Salminus orbignyanus* Cuvier & Valenciennes.
Habitat: La Plata Basin.

2. **Salminus affinis** Steindachner.
Habitat: Cauca and Rio Santiago, Ecuador.

A3. *Salminus brevidens* Cuvier.
*Salminus cuvieri* Cuvier & Valenciennes.
Habitat: Rio Cipo and La Plata Basin.

A4. *Salminus hilarii* Cuvier & Valenciennes.
Habitat: Amazon; San Francisco; Parana and Paraguay Basins.

### CATABASIS Eigenmann & Norris.

Type: *Catabasis acuminatus* Eigenmann & Norris.

Range that of the single species.

1. *Catabasis acuminatus* Eigenmann & Norris.
Habitat: Rio Tieté.

### EXODON Müller & Troschel.

*Hystricodon* Günther.

Type: *Exodon paradoxus* Müller & Troschel.

Range that of the single species.

A1. *Exodon paradoxus* Müller & Troschel.
*Epicyrtus exodon* Cuvier & Valenciennes.
Habitat: Guiana; Amazon.

## Subfamily HYDROCYNINÆ.

### HYDROCYNUS Cuvier.

Type: *Hydrocynus lucius* Cuvier.

Range: Maracaibo to Guianas, south to Amazons.

1. *Hydrocynus lucius* Cuvier.
Habitat: Not known.

### (XIPHOSTOMA Spix.)

(Type: *Xiphostoma cuvieri* Agassiz.)

A2. *Hydrocynus cuvieri* (Agassiz).
*Xiphostoma oseryi* (Castelnau).
Habitat: Guianas and Amazons.

A3. *Hydrocynus ocellatus* (Schomburgk).
Habitat: Guiana to Solimoens.

A4. *Hydrocynus maculatus* Cuvier & Valenciennes.
*Xiphostoma tædo* Cope.
Habitat: Amazons.

A5. *Hydrocynus longipinnis* (Steindachner).
Habitat: Rio Negro.

### BOULENGERELLA Eigenmann.

Type: *Xiphostoma lateristriga* Boulenger.

Range that of the single species.

A1. *Boulengerella lateristriga* (Boulenger).
Habitat: Manaos.

### LUCIOCHARAX Steindachner.

*Ctenolucius* Gill (nomen nudum); *Belonocharax* Fowler.

Type: *Luciocharax insculptus* Steindachner.

Range: Lake Maracaibo to the Atrato.

1. *Luciocharax insculptus* Steindachner.
*Belonocharax beani* Fowler.
Habitat: Magdalena Basin.

2. *Luciocharax hujeta* (Cuvier & Valenciennes).
Habitat: Lake Maracaibo.

### Subfamily ACESTRORHAMPHINÆ.

OLIGOSARGUS Günther.

Type: *Oligosargus argenteus* Günther.
Range that of the single species.

1. *Oligosargus argenteus* Günther.
Habitat: Brazil.

ACESTRORHYNCHUS Eigenmann.

*Xiphorhynchus* and *Xiphorhamphus* Müller & Troschel.
Type: *Salmo falcatus* Bloch.
Range: Guiana to Rio San Francisco and Paraguay Basins.

A1. *Acestrorhynchus falcirostris* (Cuvier).
Habitat: Guiana to Matto Grosso.

A2. *Acestrorhynchus heterolepis* (Cope).
Habitat: Peruvian Amazon.

A3. *Acestroryhnchus microlepis* (Schomburgk).
Habitat: Guianas to the Amazon.

A4. *Acestrorhynchus falcatus* (Bloch).
*Xiphorhamphus ferox* Günther.
Habitat: Guiana to Rio Paraguay.

5. *Acestrorhynchus lacustris* (Lütken).
Habitat: San Francisco Basin.

ACESTRORHAMPHUS Eigenmann.

*Sphyrænocharax* Fowler.
Type: *Xiphorhamphus hepsetus* Cuvier.
Range: La Plata Basin and southeastern Brazil.

1. *Acestrorhamphus macrolepis* (Steindachner).
Habitat: Jequitinhonha.

2. *Acestrorhamphus brachycephalus* (Cope).
Habitat: Rio Grande do Sul.

3. *Acestrorhamphus jenynsii* (Günther).
*Hydrocyon hepsetus* Jenyns (*non* Cuvier).
Habitat: La Plata and southeastern Brazil.

4. *Acestrorhamphus oligolepis* (Steindachner).
Habitat: La Plata.

5. *Acestrorhamphus hepsetus* (Cuvier).
*Hydrocyon falcatus* Quoy & Gaimard.
Habitat: La Plata and southeastern Brazil.

6. *Acestrorhamphus pericoptes* Müller & Troschel.
Habitat: Brazil.

A7. *Acestrorhamphus abbreviatus* (Cope).
Habitat: Peruvian Amazon.

ACESTROCEPHALUS Eigenmann.

Type: *Xiphorhamphus anomalus* Steindachner.
Range that of the single species.

1. *Acestrocephalus anomalus* (Steindachner).
Habitat: Cauca.

### Subfamily ERYTHRININÆ.

HOPLIAS Gill.

*Macrodon* Müller.
Type: *Esox malabaricus* Bloch.
Range: Atlantic slope north of La Plata; Pacific slope, Ecuador and northward.

1. **Hoplias microlepis** (Günther).
Habitat: Western slopes of South America from Ecuador to Panama; eastern slope of Panama.

A2. *Hoplias malabaricus* (Bloch).
*Erythrinus trahira* Spix; *Erythrinus macrodon* Agassiz; *Erythrinus microcephalus* Agassiz; *Erythrinus brasiliensis* Spix; *Macrodon guavina* Valenciennes; *Macrodon auritus* Cuvier & Valenciennes; *Macrodon teres* Cuvier & Valenciennes; *Macrodon patana* Cuvier & Valenciennes; *Macrodon aimara* Cuvier &

Valenciennes; *Macrodon ferox* Gill; *Macrodon intermedius* Günther.

Habitat: Eastern slope of South America from La Plata to Rio Magdalena and Huallaga.

3. *Hoplias malabaricus microphthalmus* Pellegrin.

Habitat: French Guiana.

4. *Hoplias lacerdæ* Ribeiro, Ribeiro, 1908.

Habitat: Ribeira.

### HOPLERYTHRINUS Gill.

*Ophiocephalops* Fowler.

Type: *Erythrinus unitæniatus* Spix.

Range: From the La Plata to the Orinoco, including south-eastern coastwise streams.

A1. *Hoplerythrinus unitæniatus* (Spix).

*Erythrinus vittatus* Cuvier & Valenciennes; *Erythrinus cinereus* Gill; *Erythrinus kessleri* Steindachner.

Habitat: La Plata to Guiana and Peru; Trinidad.

2. *Hoplerythrinus salvus* (Agassix).

*Erythrinus gronovii* Cuvier & Valenciennes.

Habitat: San Francisco; Guiana; Orinoco.

### ERYTHRINUS Gronow.

Type: *Cyprinus cylindricus* Linnæus.

Range: Rio Janeiro to Surinam and Peru.

A1. *Erythrinus erythrinus* (Bloch & Schneider).

*Cyprinus cylindricus* Linnæus; *Cyprinus cephalus* Linnæus; *Erythrinus salmoneus* Gronow; *Erythrinus brevicauda* Günther.

Habitat: Rio Janeiro to Surinam and Peru.

2. *Erythrinus longipinnis* Günther.

Habitat: Essequibo.

## Family GYMNOTIDÆ.[1]

### STERNARCHUS Bloch & Schneider.

Type: *Gymnotus albifrons* Linnæus.

Range: Paraguay, Parana and San Francisco to the Orinoco.

1. *Sternarchus brasiliensis* Reinhardt.

Habitat: Basin of the Rio San Francisco and the Parana and Paraguay.

A2. *Sternarchus albifrons* (Linnæus).

*Sternarchus lacépèdii* Castelnau; *Sternarchus maximilliani* Castelnau.

Habitat: Guianas, Amazons and Paraguay.

A3. *Sternarchus bonapartii* Castelnau.

Habitat: Amazons.

A4. *Sternarchus macrolepis* Steindachner.

Habitat: Amazon near mouth of Rio Negro; Guiana.

### STERNARCHELLA Eigenmann and Ward.

Type: *Sternarchus schotti* Steindachner.

Range: Amazons.

A1. *Sternarchella schotti* (Steindachner).

Habitat: Amazons, from the Barra do Rio Negro to Peru.

A2. *Sternarchella balænops* (Cope).

Habitat: Peruvian Amazon.

### STERNARCHOGITON Eigenmann & Ward.

Type: *Sternarchus nattereri* Steindachner.

Range: Rio Negro and Orinoco.

A1. *Sternarchogiton nattereri* (Steindachner).

Habitat: Barra do Rio Negro.

2. *Sternarchogiton sachsi* (Peters).

Habitat: Orinoco.

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[1] For the details concerning this family, see Eigenmann & Ward, Proc. Wash. Acad Sci., vii, pp. 159–188.

### STERNARCHORHAMPHUS Eigenmann & Ward.

Type: *Sternarchus mülleri* Steindachner.

Range: Para to Peru.

A1. *Sternarchorhamphus macrostomus* (Günther).

Habitat: Peruvian Amazon.

A2. *Sternarchorhamphus mülleri* (Steindachner).

Habitat: Para.

A3. *Sternarchorhamphus tamandua* (Boulenger).

Habitat: Jurua.

### STERNARCHORHYNCHUS Castelnau.

Type: *Sternarchoryhnchus mülleri* Castelnau=*Sternarchus oxyrhynchus*. Müller & Troschel.

Range: Peruvian Amazon to Guiana.

A1. *Sternarchorhynchus mormyrus* (Steindachner).

Habitat: Marabitanos; Peruvian Amazon.

2. *Sternarchorynchus oxyrhynchus* (Müller & Troschel).

*Sternarchorhynchus mülleri* Castelnau.

Habitat: Guiana.

A3. *Sternarchorhynchus curvirostris* (Boulenger).

Habitat: Canelos.

### RHAMPHICHTHYS Müller & Troschel.

Type: *Gymnotus rostratus* Linnæus.

Range: Rio de La Plata to Guiana.

A1. *Rhamphichthys rostratus* (Linnæus).

*Gymnotus longirostris*. Lacépède; *Rhamphichthys schomburgkii* and *schneideri* Kaup.

Habitat: The Guianas to the Amazons.

A2. *Rhamphichthys marmoratus* Castelnau.

*Rhamphichthys pantherinus* and *lineatus* Castelnau.

Habitat: Orinoco and Guiana south to the Rio de La Plata.

A3. *Rhamphichthys reinhardtii* (Kaup).

*Rhamphichthys blochii* Kaup.

Habitat: Rio Negro south to Paraguay.

### HYPOPOMUS Gill.

Type: *Rhamphichthys mülleri* Kaup.

Range: Paraguay to Cauca.

1. *Hypopomus artedi* (Kaup).

*Rhamphichthys mülleri* Kaup.

Habitat: French Guiana.

A2. *Hypopomus brevirostris* (Steindachner).

Habitat: Cauca; Guiana to Paraguay.

### STEATOGENYS Boulenger.

Type: *Rhamphichthys elegans* Steindachner.

Range that of the single species.

A1. *Steatogenys elegans* (Steindachner).

*Rhamphichthys mirabilis* Steindachner.

Habitat: Solimoens and tributaries; Guiana.

### EIGENMANNIA Jordan & Evermann.

Type: *Sternopygus humboldtii* Steindachner.

Range: Rio de La Plata to Rio Magdalena and Pacific slope of Panama.

1. *Eigenmannia microps* (Boulenger).

Habitat: British Guiana.

2. **Eigenmannia humboldtii** (Steindachner).

Habitat: Marajo; Magdalena; Mamoni.

A3. *Eigenmannia virescens* (Valenciennes).

*Sternopygus tumifrons* and *lineatus* Müller & Troschel; *Sternopygus microstomus* Reinhardt; *Sternopygus limbatus* Schreiner.

Habitat: Rio Magdalena to the Rio de La Plata and Rio San Francisco.

A4. *Eigenmannia axillaris* (Günther).

Habitat: Para.

A5. *Eigenmannia troscheli* (Kaup).

Habitat: Amazons from Manaos to Peru.

### GYMNOTUS Linnæus.[1]

*Giton* Kaup.

Type: *Gymnotus carapo* Linnæus.

Range that of the single species.

A1. *Gymnotus carapo* Linnæus.

*Gymnotus fasciatus* Pallas; *Gymnotus albus* Pallas; *Gymnotus brachyurus* Bloch; *Gymnotus putaol* Lacépède; *Carapus brachyurus* Cuvier; *Carapus inæquilabiatus* Valenciennes.

Habitat: Rio Motagua south to Rio de La Plata and San Francisco.

2. *Gymnotus carapo pantherinus* (Steindachner), . . . . . . . . . . . . St., 1908*d*,

Habitat: Santos.

### STERNOPYGUS Müller & Troschel.

Type: *Sternopygus macrurus* (Bloch & Schneider).

Range: Paraguay and Rio San Francisco to Magdalena and Guayaquil.

A1. *Sternopygus macrurus* Bloch & Schneider.

*Carapus arenatus* Eydoux Souleyet; *Carapus sanguinolentus* Castelnau; *Sternopygus marcgravii* Reinhardt; *Gymnotus carapus* Günther and other recent authors *non* Linnæus.

Habitat: Orinoco, south to Paraguay and Rio das Velhas.

2. **Sternopygus æquilabiatus** (Humboldt).

Habitat: Magdalena and Guayaquil.

A3. *Sternopygus obtusirostris* Steindachner.

Habitat: Amazons and Rio Puty.

4. *Sternopygus æquilabiatus nigriceps* von Ihering, . . . . . . . . . . . . . . v. I., 1907.

Habitat: State of Maraubam.

## Family ELECTROPHORIDÆ.

### ELECTROPHORUS Gill.

Type: *Gymnotus electricus* Linnæus.

Range that of the single species.

A1. *Electrophorus electricus* (Linnæus), Günther, VIII, 10.

Habitat: Brazil and northward.

## Order SYNBRANCHIA.

## Family SYNBRANCHIDÆ.

### SYNBRANCHUS Bloch.

*Unibranchapterura* Lacépède; *Ophisternon* McClelland; *Tetrabranchus* Bleeker.

Type: *Synbranchus marmoratus* Bloch.

Range: Tropical America and Indies.

A1. **Synbranchus marmoratus** Bloch, Meek, 89.

*Synbranchus immaculatus* Bloch; *S.*

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[1] In a recent paper (The Gymnotidæ, Proc. Wash. Acad. Sci., VII, p. 174) I followed Gill in using the name *Gymnotus* for the current *Gymnotus carapo* Linnæus, this species being the only one described by Linnæus in his tenth edition. No doubt seems to have been entertained about the nature of the *Gymnotus carapo* of Linnæus and its supposed synonymy and bibliography were given in the paper quoted above, p. 175.

Mr. Lönnberg has kindly called my attention to his paper (Bihang till K. Svenska Vet.-Akad. Handb., XXII, Afd. IV, 23, 1896) on Linnean Type-specimens in which he has shown that the type of Linnæus is not the current *Gymnotus carapo*, but the *Gymnotus fasciatus* of Pallas or *Giton fasciatus* Auct. The latter species must therefore stand as *Gymnotus carapo* Linnæus, the name *Gymnotus* replacing the more recent *Giton*.

The current *Gymnotus carapus* must be known by its oldest name, which is *macrurus* Bloch & Schneider. Müller & Troschel in 1849 proposed the name *Sternopygus* for *macrurus, tumifrons, virescens, lineatus,* and *æquilabiatus.* In 1894 I selected as the type of *Sternopygus* the then current *carapo,* of which *macrurus* was a synonym. The fact that the name *carapo* of Linnæus did not refer to the species under consideration need not invalidate this restriction, since there was no doubt whatever about the fish that was intended to serve as type. It may stand as *Sternopygus macrurus* (Bloch & Schneider).

*transversalis* Bloch & Schneider; *Unibranchapterura grisea* and *lineata* Lacépède; *Synbranchus fuliginosus* Ranzani; *Murœna lumbricus* Gronow; *Synbranchus vittatus* Castelnau; *Synbranchus hieronymi, döringii* and *tigrinus* Weyenberg.

Habitat: Cuba; Vera Cruz to La Plata and Peru; both sides of Guatemala and Panama.

## Order APODES.

### Family ANGUILLIDÆ.

ANGUILLA Shaw.

Type: *Anguilla anguilla* (Linnæus).

Range: North temperate to tropical waters.

1. *Anguilla chrysypa* Rafinesque,[1] J. & E., 348.

Habitat: Cuba and Central America and northward.

## Order ISOSPONDYLI.

### Family ENGRAULIDÆ.

STOLEPHORUS Lacépède.

Type: *Atherina japonica* Houttuyn.

Range: Marine, entering rivers. A marine genus with many species on both coasts; some of them entering rivers.[2]

1. **Stolephorus poeyi** (Kner & Steindachner), ............... J. & E., 445.

Habitat: Rio Bayano, near Panama, and Ribeira?

A2. *Stolephorus clupeoides* (Swainson), J. & E., 447.

*Stolephorus surinamensis* Bleeker.

Habitat: Surinam; Rio Capin; Bahia; Rio Grande do Sul.

A3. *Stolephorus spinifer* Cuvier & Valenciennes, ............ J. & E., 448.

Habitat: Guianas; Bahia; Panama.

A4. *Stolephorus nattereri* (Steindachner), 1879*b*, 57.

Habitat: Para.

5. *Stolephorus olidus* Günther, ...... 1880.

Habitat: La Plata; Parana.

6. *Stolephorus manjuba* Ribeiro, Ribeiro, 1908.

Habitat: Santa Catharina.

7. *Stolephorus brevirostris* (Günther), G., VII., 392.

Habitat: Province of Bahia.

8. *Stolephorus vaillanti* (Steindachner), Steind., 1908*g*, 193.

Habitat: Rio San Francisco.

ANCHOVIA Jordan & Evermann.

Type: *Engraulis macrolepidotus* Kner & Steindachner.

Range: Marine.

1. **Anchovia macrolepidota** (Kner & Steindachner), ...... J. & E., 449.

Habitat: Gulf of California to Panama, entering rivers.

PTERENGRAULIS Günther.

Type: *Clupea atherinoides* Linnæus.

Range: Marine.

A1. *Pterengraulis atherinoides* (Linnæus), J. & E., 451.

Habitat: Coasts of Guiana and Brazil, entering rivers.

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[1] For the synonymy see J. & E., 348.

[2] *Stolephorus januarius* Steindachner. Ichthyol. Beitr., VIII, 58.

Habitat: Rio de Janeiro Bay.

*Stolephorus peruanus* Steindachner. Ichthyol. Beitr., VIII, 60.

Habitat: Callao, Peru.

*Stolephorus tapirulus* Cope. 1877, 45.

Habitat: Coast of Peru.

### LYCENGRAULIS Günther.

Type: *Engraulis grossidens* Cuvier.
Range: Marine.

A1. *Lycengraulis grossidens* (Cuvier), J. & E., 451.
*Engraulis janeiro* Agassiz; *Engraulis dentex* Cuvier & Valenciennes.
Habitat: Coast of Guiana to Rio de Janeiro, entering rivers.

A2. *Lycengraulis batesii* Günther, G. VII., 309.
Habitat: Rio Para.

### CETENGRAULIS Günther.

Type: *Cetengraulis edentulus* Günther.
Range: Chiefly marine; one record for fresh water.

A1. *Cetengraulis juruensis* Boulenger, 1898, 425.
Habitat: Rio Jurua.

## Family CLUPEIDÆ.[1]

### CLUPEA Linnæus.

*Rogenia* Cuvier & Valenciennes.
Type: *Clupea harengus* Linnæus.
Range: Marine.

A1. *Clupea amazonica* Steindachner, St., 1878, 65.
Habitat: Para.

### ILISHA Gray.[2]

*Platygaster* Swainson; *Pellona* Cuvier & Valenciennes.
Type: *Ilisha abnormis* Gray.
Range: Marine.

A1. *Ilisha flavipinnis* (Valenciennes), J. & E., 435.
*Pellona orbigniana* and *castelnœana* Cuvier & Valenciennes.
Habitat: Coast of Surinam to La Plata, entering rivers.

A2. *Ilisha altamazonica* (Cope), 1872, 256.
Habitat: Ambyiacu to the Tocantins.

### PRISTIGASTER Cuvier.

Type: *Pristigaster cayanus* Cuvier.
Range: Marine, entering rivers.

A1. *Pristigaster cayanus* Cuvier, J. & E., 438.
*Pristigaster martii* Agassiz; *Pristigaster phaëton* Cuvier & Valenciennes.
Habitat: Coast of Guiana and northern Brazil, entering rivers; Rio Jurua.

2. **Pristigaster effulgens** Regan, Regan, 1903.
Habitat: Rio Vagueria, northwest Ecuador.

## Family DOROSOMIDÆ.

### DOROSOMA Rafinesque.

Type: *Dorosoma notatum* Rafinesque.
Range: Lake Peten through the Mississippi valley.

1. *Dorosoma anale* Meek,[3] . . . . Meek, 1893.
Habitat: Atlantic streams of Mexico, south of Vera Cruz.

2. *Dorosoma petenense* Günther, Günther, VII., 408.
Habitat: Lake Peten.

3. *Dorosoma chavesi* Meek, M., 1907, 112.
Habitat: Nicaragua.

### SIGNALOSA Evermann & Kendal.

Type: *Signalosa atchafalayæ* Evermann & Kendal.
Range that of the single species.

1. *Signalosa mexicana* (Günther), VII., 409.

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[1] *Pomolobus melanostomus* Eigenmann, La Plata.

[2] *I. bahiensis* Steindachner, Bay of Bahia; *I. panamensis* Steindachner, Panama and Guayaquil; *I. fürthi* Steindachner, Punta Arenas, Panama.

[3] *Dorosoma exile,* Atlantic streams north of Vera Cruz.

*Signalosa atchafalayæ* Evermann & Kendal.

Habitat: Louisiana to Central America, in lowland streams emptying into Gulf of Mexico.

## Family ELOPIDÆ.

TARPON Jordan & Evermann.

Type: *Megalops atlanticus* Cuvier & Valenciennes.

Range: Marine.

1. *Tarpon atlanticus* (Cuvier & Valenciennes), ............J. & E., 409.

*Megalops elongatus* Girard; *Megalops thrissoides* Günther.

Habitat: Long Island to Brazil, entering rivers.

## Family OSTEOGLOSSIDÆ.

OSTEOGLOSSUM Vandelli.

*Ischnosoma* Spix; *Scleropages* Günther.

Type: *Osteoglossum bicirrhosum* Vandelli.

Range: Tropical America; Australia and the East Indian Archipelago.

A1. *Osteoglossum bicirrhosum* Vandelli, Günther, VII., 378.

*Osteoglossum vandellii* Cuvier; *O. arowana* Schomburgk; *O. minus* Valenciennes.

Habitat: Guianas to Para and Huallaga.

## Family ARAPAIMIDÆ.

ARAPAIMA Müller.

*Sudis* Cuvier; *Vastres* Cuvier & Valenciennes.

Type: *Sudis gigas* Cuvier.

Range that of the single species.

A1. *Arapaima gigas* (Cuvier), G. VII, 379.

*Sudis pirarucu* Spix; *Vastres cuvieri, mapæ, agassizii, arapaima* Cuvier & Valenciennes.

Habitat: Guiana to Bahia and the Peruvian Amazon.

# Order HAPLOMI,

## Family PŒCILIIDÆ.[1]

CYNODONTICHTHYS Meek.

Type: *Cynodontichthys tenuis* Meek.

Range that of the single species.

1. **Cynodontichthys tenuis** Meek, Meek, 107.

Habitat: Oaxaca, Mexico.

FUNDULUS Lacépède.[2]

Type: *Fundulus mudfish* Lacépède.

*Hydrargira* Lacépède.

Range: Central America, south to Paraguay and Peru and north to Cape Cod and California. In fresh and salt water.

1. **Fundulus punctatus** Günther, Meek, 103.

*F. guatemalensis* Günther; *F. oaxacæ* Meek.

Habitat: Lakes Dueñas, Amatitlan; Rio Guacalate; western Ecuador; Mexico.

2 **Fundulus extensus** Jordan & Gilbert, J. & E., 646.

Habitat: Lower California.

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[1] I am unable to locate *Rhodeoides vaillanti* Thominot, Bull. Soc. Philom. (7), VIII, 150 (Magdalena River, Bolivia).

[2] *Fundulus vinctus* Jordan & Gilbert, ......Meek, 105. Habitat: Southern portion of Lower California.

3. **Fundulus pachycephalus** Günther, J. & E., 660.
Habitat: Lake Atitlan.

4. *Fundulus labialis* Günther, . . Meek, 107.
Habitat: Rio San Geronimo; Lake Yzabal, Guatemala.

5. *Fundulus cubensis* Eigenmann, Eigenm., 1903, 222.
Habitat: Rio del Pinar, Cuba.

6. *Fundulus paraguayensis* Eigenmann & Kennedy, . . . . . . E. & K., 1903, 530.
Habitat: Arroyo Trementina, Paraguay.

7. *Fundulus balzanii* (Perugia), P., 1891, 653.
Habitat: Villa Maria, Paraguay.

### APLOCHEILUS McClellan.

Type: *Aplocheilus chrysostigmus* McClellan.
Range: Tropical America; boundaries not well defined.

1. **Aplocheilus peruanus** Regan, Regan, 1903, 626.
Habitat: Perim, Peru; 800 meters.

2. *Aplocheilus dovii* Günther, J. & E., 650.
Habitat: Punta Arenas, Costa Rica.

3. *Aplocheilus harti* Boulenger, Regan, 1906*c*, 389.
Habitat: Trinidad.

### ZOOGONETICUS Meek.

Type: *Platypœcilus cuitzenoensis* Bean.
Range: Principally in Mexican plateau, south to Lake Atitlan.

1. **Zoogoneticus cuitzenoensis** (Bean), Meek, 110.
Habitat: Rio Lerma Basin.

2. **Zoogoneticus dugesii** (Bean), Meek, 111.
Habitat: Rio Lerma Basin.

3. **Zoogoneticus pachycephalus** (Günther), . . . . . . . . . . . . . . . Meek, 112.
Habitat: Lake Atitlan.

4. **Zoogoneticus robustus** (Bean), Meek, 112.
*Z. maculatus* Regan.
Habitat: Rio Lerma Basin.

5. **Zoogoneticus diazi** Meek, . . Meek, 114.
Habitat: Rio Lerma Basin.

6. **Zoogoneticus miniatus** Meek,[1] Meek, 115.
Habitat: Valley of Mexico.

### RIVULUS Poey.

Type: *Rivulus cylindraceus* Poey.
Range: United States to Paraguay.

A1. *Rivulus brasiliensis* (Valenciennes), Günther, VI, 317.
*Rivulus urophthalmus* Günther; *Rivulus poeyi* Steindachner.
Habitat: Para; Gurupa; Cayenne.

A2. *Rivulus micropus* (Steindachner).
Habitat: Rio Negro to Pebas; Venezuela; Trinidad.

3. *Rivulus ocellatus* Hensel, . . . . 1868, 365.
Habitat: Rio Janeiro.

4. *Rivulus elegans* Steindachner, 1880, 33.
Habitat: Cauca.

5. *Rivulus punctatus* Boulenger, . . . 1895, 3.
Habitat: Colonia Risso.

6. **Rivulus isthmensis** Garman, J. & E., 2830.
Habitat: Rio San Jose; Costa Rica.

A7. *Rivulus ornatus* Garman, Garman, 139.
Habitat: Amazons.

A8. *Rivulus obscurus* Garman, Garman, 140.
Habitat: Lake Hyanuary.

A9. *Rivulus atratus* Garman, Garman, 140.
Habitat: Jutahy.

10. *Rivulus flabellicauda* Regan, Regan, 1907, 64.
Habitat: Juan Veñas, Costa Rica.

11. *Rivulus godmanni* Regan, Regan, 1907, 65.
Habitat: Guatemala.

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[1] = *diazi* fide Regan.

12. *Rivulus tenuis* Meek, Meek, 1904, 101.
Habitat: El Hule in Oaxaca.

13. *Rivulus breviceps* Eigenmann, Eigenm., 1909, 49.
Habitat: Shrimp Creek, near Kaieteur.

14. *Rivulus holmiæ* Eigenmann, Eigenm., 1909, 50.
Habitat: Upper Potaro.

15. *Rivulus waimacui* Eigenmann, Eigenm., 1909, 50.
Habitat: Shrimp Creek, near Kaieteur.

16. *Rivulus stagnatus* Eigenmann, Eigenm., 1909, 50.
Habitat: Lower Potaro.

17. *Rivulus lanceolatus* Eigenmann, Eigenm., 1909, 51.
Habitat: Rockstone, British Guiana.

18. *Rivulus frenatus* Eigenmann, Eigenm., 1909, 51.
Habitat: Gluck Island, British Guiana.

### PTEROLEBIAS Garman.

Type: *Pterolebias longipinnis* Garman.
Range that of the single species.

A1. *Pterolebias longipinnis* Garman, Garman, 142.
Habitat: Santarem.

### CYNOLEBIAS Steindachner.[1]

Type: *Cynolebias porosus* Steindachner.
Range: La Plata to Pernambuco.

1. *Cynolebias bellottii* Steindachner, Steindachner, 1881, 9.
Habitat: La Plata.

2. *Cynolebias maculatus* Steindachner, Steindachner, 1881, 10.
Habitat: La Plata.

3. *Cynolebias elongatus* Steindachner, Steindachner, 1881, 11.
Habitat: La Plata.

4. *Cynolebias robustus* Günther, Günther, 1883.
Habitat: San Antonio; Buenos Aires.

5. *Cynolebias porosus* Steindachner, Steindachner, 1876, 124.
Habitat: Pernambuco.

### GIRARDINICHTHYS Bleeker.

*Limnurgus* Günther.
Type: *Girardinichthys innominatus* Bleeker.
Range that of the single species.

1. **Girardinichthys innominatus** Bleeker, Meek, 116.
*Limnurgus variegatus* Günther; *Characodon geddesi* Regan.
Habitat: Valley of Mexico.

### ILYODON Eigenmann.

Type: *Ilyodon paraguayensis* Eigenmann.
Range that of the single species.

1. *Ilyodon paraguayensis* Eigenmann, 1907a, 428.

### CHARACODON Günther.

Type: *Characodon lateralis* Günther.
Range: Mexico and Central America.

1. **Characodon multiradiatus** Meek, Meek, 119.
Habitat: Rio Lerma Basin.

2. **Characodon eiseni** Rutter,[2] . Meek, 119.
Habitat: Lowland streams of Jalisco and Tepic.

3. **Characodon variatus** Bean, . Meek, 120.
*Characodon ferrugineus* Bean.
Habitat: Rio Lerma Basin.

4. **Characodon lateralis** Günther, Meek, 121.
Habitat: Central America, north to Jalisco.

5. **Characodon garmani** Jordan & Evermann,[3] . . . . . . . . . . . . . . . . Meek, 121.
Habitat: Headwaters of Rios Mezquital and Nazas.

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[1] Garman considers *elongatus* a synonym of *porosus* and *robustus* a synonym of *maculatus*.

[2] = *variatus* fide Regan.

[3] = *lateralis* fide Regan.

6. **Characodon furcidens** Jordan & Gilbert, Meek, 122.
Habitat: Southern Lower California and lowland streams of Jalisco and Colima.

CHAPALICHTHYS Meek.

Type: *Characodon encaustus* Jordan & Snyder.
Range that of the single species.

1. **Chapalichthys encaustus** (Jordan & Snyder), ............. Meek, 123.
Habitat: Basin of the Rio Lerma.

CYPRINODON Lacépède.

*Prinodon* Rafinesque.
Type: *Cyprinodon variegatus* Lacépède..
Range: Central America north to Rio Colorado and Cape Cod, south to the Amazon.

1. **Cyprinodon bovinus** Baird & Girard, Meek, 126.
C. *eximius* Girard; *C. latifasciatus* Garman; *C. elegans* Meek.
Habitat: Rio Nasas and headwaters of the Rio Mezquital.

A2. *Cyprinodon amazonus* Eigenmann, Eigenm., 1894, 627.
Habitat: Lower Amazon.

3. *Cyprinodon martæ* Steindachner, Steind., 1876, 28.
Habitat: Near mouth of the Rio Magdalena.

4. *Cyprinodon variegatus* Lacépède, J. & E., 672.
*Esox ovinus* Mitchill; *Lebias rhomboidalis* Val., *Lebias ellipsoidea* Le Sueur; *Cyprinodon gibbosus* B. & G.; *Trifarcins riverendi* Poey.

5. *Cyprinodon dearborni* Meek, Meek, 1909, 208.
Habitat: Curaçoa, Dutch W. I.

PSEUDOXIPHOPHORUS Bleeker.[1]

*Pœcilioides* Steindachner.
Type: *Xiphophorus bimaculatus* Heckel.
Range: Eastern slope of Mexico.

1. *Pseudoxiphophorus bimaculatus* (Heckel), ............ Meek, 127.
*P. reticulatus* Trosch.; *P. b. tæniatus* Regan.
Habitat: Eastern slopes of Mexico from Jalapa to Guatemala, up to an altitude of 600 feet.

2. *Pseudoxiphophorus jonesi* Günther, Regan, 1907*a*, 260.
*P. bimaculatus* J. & E., *non* Heck.; *P. pauciradiatus* Regan.
Habitat: Orizaba.

PETALOSOMA Regan.

Type: *Petalosoma cultratum* Regan.
Range that of the single species.

1. *Petalosoma cultratum* Regan, Regan, 1909*d*, 458.
Habitat: Costa Rica.

GAMBUSIA Poey.

Type: *Gambusia punctata* Poey.
Range: Mexico north to the Southern States.

1. *Gambusia punctata* Poey, J. & E., 679.
Habitat: Fresh waters of Cuba.

2. *Gambusia puncticulata* Poey, J. & E., 680.
Habitat: Fresh waters of Cuba.

3. *Gambusia annectens* Regan, Regan, 1907*a*, 259.
Habitat: Carrullo and Juan Veñas, Costa Rica.

4. *Gambusia episcopi* Steindachner, J. & E., 683.
Habitat: Ditches at Obispo, Panama.

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[1] This genus should according to Regan be merged with *Gambusia*.

5. **Gambusia fasciata** Meek, ..Meek, 129.
   Habitat: Pacific slope of the Isthmus of Tehuantepec.
6. **Gambusia gracilis** (Heckel), Meek, 130.
   Habitat: Both slopes south of the City of Mexico.
7. *Gambusia affinis* (Baird & Girard), Meek, 130.
   *Heterandria nobilis* Baird & Girard; *Gambusia speciosa, gracilis* and *senilis* Girard.
   Habitat: Rio Panuco; Rio Conchos and northward.
8. *Gambusia tridentiger* Garman, J. & E., 2833.
   Habitat: Fresh waters of the Isthmus of Panama.
9. **Gambusia infans** Woolman, Meek, 131.
   Habitat: Rio Lerma Basin.
10. *Gambusia bonita* Meek, ....Meek, 132.
   Habitat: Rio Papaloapam.
11. **Gambusia terrabensis** Regan, Regan, 1907*a*, 260.
   Habitat: Rio Grande de Terraba, Pacific slope of Costa Rica.
12. *Gambusia rhabdophora* Regan, Regan, 1908*d*.
   Habitat: Costa Rica.

### PARAGAMBUSIA Meek.

Type: *Gambusia nicaraguensis* Günther.

Range that of the single species.

1. *Paragambusia nicaraguensis* (Günther), Meek, 133.
   Habitat: Southern Mexico and Lake Nicaragua.

### BELONESOX Kner.

Type: *Belonesox belizanus* Kner.

Range that of the single species.

1. *Belonesox belizanus* Kner, ..Meek, 135.
   Habitat: Southern Mexico; Lake Peten; Honduras; Guatemala.

### ANABLEPS Bloch.

Type: *Anableps tetrophthalmus* Bloch.

Range: Isthmus of Tehuantepec to the Amazons.

1. **Anableps dowei** Gill, ......Meek, 136.
   Habitat: Rio Tehuantepec to Panama.

A2. *Anableps anableps* (Linnæus), Günther, VI, 337.
   *Anableps tetrophthalmus* Bloch; *A. surinamensis* Lacépède; *A. gronovii* Cuvier & Valenciennes; *A. lineatus* Gronow.
   Habitat: Guianas; Orinoco; Amazons.

A3. *Anableps microlepis* Garman, Garman, 78.
   *Anableps coactatus* and *elongatus* Cuvier & Valenciennes.
   Habitat: Para to Guiana.

### FITZROYA Günther.

*Jenynsia* Günther.

Type: *Labias multidentatus* Jenyns.

Range: La Plata to Rio Grande do Sul.

1. *Fitzroya lineata* (Jenyns), Garman, 69.
   *Lebias multidentatus* Jenyns; *Pœcilia punctata* Valenciennes; *Xiphophorus obscurus minor* and *heckelii* Weyenberg.
   Habitat: La Plata and Rio Grande do Sul.
2. *Fitzroya pyrogramma* Boulenger, Boul., 1902, 336.
   Habitat: Argentine Republic.

### GLARIDICHTHYS Garman.

*Glaridodon* Garman.

Type: *Glaridodon latidens* Garman.

Range: Cuba and northern Mexico.

1. *Glaridichthys latidens* (Garman), Meek, 134.
   Habitat: Chihuahua.
2. *Glaridichthys uninotatus* Poey, J. & E., 687.

Habitat: Fresh waters of Cuba.

3. *Glaridichthys falcatus* Eigenmann,
Eigenm., 1903, 224.
Habitat: Fresh waters of Cuba.

4. *Glaridichthys torralbasi* Eigenmann,
Eigenm., 1903, 225.
Habitat: Fresh waters of Cuba.

### TOXUS Eigenmann.

Type: *Toxus riddlei* Eigenmann.
Range that of the single species.

1. *Toxus riddlei* Eigenmann,
Eigenm., 1903, 226.
Habitat: San Cristobal, Cuba.

### GIRARDINUS Poey.

Type: *Girardinus metallicus* Poey.
Range: Cuba to Rio Grande do Sul.

1. *Girardinus metallicus* Poey, J. & E., 687.
Habitat: Fresh waters of Cuba.

2. *Girardinus denticulatus* Garman,
Garman, 47.
Habitat: Remedios, Cuba.

3. *Girardinus creolus* Garman, Garman, 47.
Habitat: Cuba.

4. *Girardinus garmani* Eigenmann,
Eigenm., 1903, 226.
Habitat: Pinar del Rio, Cuba.

5. *Girardinus caucanus* Steindachner,
Steind., 1880.
Habitat: Cauca.

### PHALLOPTYCUS Eigenmann.

Type: *Girardinus januarius* Hensel.
Range that of the single species.

1. *Phalloptychus januarius* (Hensel),
E., 1907*a*, 430.
*Girardinus iheringii* Boulenger; ? *Gambusia gracilis* Perugia.
Habitat: Rio de Janeiro to Rio Grande do Sul.

### PHALLOCEROS Eigenmann.

Type: *Girardinus caudomaculatus* Hensel.
Range that of the single species.

1. *Phalloceros caudomaculatus* (Hensel),
E., 1907*a*, 431.
Habitat: Rio Negro to Rio de Janeiro and Paraguay.

### ACANTHOPHACELUS Eigenmann,

Type: *Pœcilia reticulata* Peters.
Range: Leeward Islands, northern South America.

1. *Acanthophacelus guppii* (Günther),
G., VI, 353.
Habitat: Trinidad; Venezuela.

2. *Acanthophacelus reticulatus* (Peters),
J. & E., 2833.
*Pœcilia vandepolli*[1] and *orubensis* Van Lidth de Jende.
Habitat: Leeward Islands; Guiana.

3. *Acanthophacelus melanzonus* Eigenmann,
Eigenm., 1909, 51.
Habitat: Georgetown Trenches.

4. *Acanthophacelus bifurcus* Eigenmann,
Eigenm., 1909, 52.
Habitat: Creeks near Wismar, British Guiana.

### CNESTERODON Garman.

Type: *Pœcilia decemmaculata* Jenyns.
Range: Amazons to Maldonado.

1. *Cnesterodon decemmaculatus* (Jenyns),
Garman, 44.
Habitat: Rio Grande do Sul to Maldonado.

A2. *Cnesterodon scalpridens* Garman,
Garman, 45.
Habitat: Amazons.

### GOODEA Jordan.

Type: *Goodea atripinnis* Jordan.
*Xenendum* Jordan & Snyder.
Range: Rio Lerma Basin and headwaters of the streams approaching it.

1. **Goodea whitei** Meek, ......Meek, 137.

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[1] Meek, 1909, 209, considers this a *Girardinus*.

Habitat: Upper Balsas Basin.

2. *Goodea toweri* Meek, ......Meek, 138.
Habitat: Upper Panuco Basin.

3. **Goodea luitpoldi** (Steindachner),[1] Meek, 139.
*Xenendum xaliscone* Jordan & Snyder.
Habitat: Rio Lerma Basin.

4. **Goodea atripinnis** Jordan, ..Meek, 140.
*Xenendum caliente* Jordan & Snyder.
Habitat: Lerma and Panuco Basins.

5. **Goodea calientis** Jordan & Snyder, Meek, 148.
*Goodea atripinnis* Meek.
Habitat: Lerma and upper tributaries of Rio Panuco.

### SKIFFIA Meek.

Type: *Skiffia lermæ* Meek.
Range: Lerma Basin.

1. **Skiffia multipunctata** (Pellegrin), Meek, 141.
Habitat: Rio Lerma Basin.

2. **Skiffia lermæ** Meek, ......Meek, 142.
Habitat: Rio Lerma Basin.

3. **Skiffia variegata** Meek, ....Meek, 143.
Habitat: Rio Lerma Basin.

4. **Skiffia bilineata** (Bean), ..Meek, 144.
Habitat: Rio Lerma Basin.

### PLATYPŒCILUS Günther.[2]

Type: *Platypœcilus maculatus* Günther.
Range: Mexico, south to Panama.

1. *Platypœcilus maculatus* Günther, Meek, 145.
Habitat: Atlantic lowland streams south of Vera Cruz.

2. *Platypœcilus tropicus* Meek, Meek, 1907*a*, 146.
Habitat: Costa Rica at Turrialba.

3. *Platypœcilus spilonotus* Regan, Regan, 1909, 460.
Habitat: San José.

4. *Platypœcilus nelsoni* Meek, ..Meek, 147.
Habitat: Papayo; Guerrero.

### HETERANDRIA Agassiz.

Type: *Limia formosa* Girard.
Range: Cuba and Mexico to Amazon.

1. **Heterandria pleurospilus** (Günther), Meek, 148.
Habitat: Pacific slope of southern Mexico and Central America; Lake of Dueñas.

2. **Heterandria lutzi** Meek, ....Meek, 148.
Habitat: Atlantic and Pacific slopes of southern Mexico.

3. **Heterandria presidionis** Jordan & Culver, ..................Meek, 152.
Habitat: Presidio.

4. *Heterandria cubensis* Eigenmann, E., 1903*a*, 227.
Habitat: Fresh waters of western Cuba.

A5. *Heterandria minor* Garman, Garman, 92.
Habitat: Villa Bella.

### PŒCILIA Bloch & Schneider.

Type: *Pœcilia vivipara* Bloch & Schneider.
Range: West Indies and Mexico to Ecuador and Montevideo.

1. *Pœcilia vittata* Guichenot, ..J. & E., 692.
*Limia cubensis* Poey.
Habitat: Cuba.

2. *Pœcilia latipunctata* Meek,[3] ..Meek, 150.
Habitat: Basin of the Rio Panuco.

3. **Pœcilia butleri** Jordan, ....Meek, 151.
Habitat: Fresh and brackish water from Mazatlan to Tehuantepec.

4. **Pœcilia sphenops** Cuvier & Valenciennes, ..................Meek, 153.
*Molienesia fasciata* Müller & Troschel; *Gambusia modesta* and *plumbea*

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[1] = *atripinnis* fide Regan.

[2] *Platypœcilus mentalis* Gill may be found in fresh water at Panama. Proc. Acad. Nat. Sci. Phila, 1876, 335.

[3] = *sphenops* fide Regan.

Troschel; *Pœcilia mexicana* Steindachner; *Pœcilia limantouri* Jordan & Snyder; *P. chisoyensis dovii gillii* Günther.

Habitat: Atlantic slope from Monterey, Mexico, to Costa Rica; Pacific slope from the Rio Balsas, Mexico, to Lake Amatitlan, Guatemala.

5. *Pœcilia vivipara* Bloch & Schneider, J. & E., 691.

*Pœcilia surinamensis* and *unimaculata* Valenciennes; *Pœcilia schneideri* Cuvier & Valenciennes.

Habitat: Martinique; Guianas; Rio Grande do Sul and Paraguay.

A6. *Pœcilia vivipara parœ* Eigenmann, Eigenm., 1894, 628.

Habitat: Rio das Mogubas; Para.

7. *Pœcilia gillii* (Kner & Steindachner),[1] J. & E., 692.

Habitat: Rio Chagres.

8. **Pœcilia thermalis** Steindachner,[1] J. & E., 693.

Habitat: Warm springs of San Salvador, Mexico.

9. *Pœcilia petenensis* Günther, J. & E., 694.

Habitat: Lake Peten.

10. *Pœcilia boucardi* Steindachner,[1] J. & E., 695.

Habitat: Atlantic slope of the isthmus of Panama.

11. *Pœcilia dominicensis* Cuvier & Valenciennes, ........... J. & E., 696.

Habitat: San Domingo and the Barbadoes.

12. *Pœcilia melanogaster* Günther, J. & E., 696.

Habitat: ? Jamaica.

13. *Pœcilia spilurus* Günther, J. & E., 697.

Habitat: Central America.

14. *Pœcilia elongata* Günther, J. & E., 697.

Habitat: Streams about Panama.

15. *Pœcilia punctata* Cuvier & Valenciennes, Günther, VI, 65.

Habitat: Montevideo.

16. *Pœcilia salvatoris* Regan, 1907–8, 104.

*P. thermalis* Regan (*non* Steind.).

Habitat: Salvador.

17. **Pœcilia festæ** Boulenger, .... 1898, 13.

Habitat: Hot springs, San Vicenta; Santa Elena, Ecuador.

A18. *Pœcilia branneri* Eigenmann, 1894, 629.

Habitat: Santarem; Para.

A19. *Pœcilia amazonica* Garman, Garman, 64.

Habitat: Santa Cruz; Para.

20. *Pœcilia amates* Miller, Miller, 1907, 108.

Habitat: Basin of Rio Motagua.

21. *Pœcilia tenuis* Meek, Meek, 1907*a*, 147.

Habitat: Costa Rica.

22. *Pœcilia caudata* Meek, Meek, 1909, 209.

Habitat: Costa Rica.

23. *Pœcilia retropinna* Regan, Regan, 1908*d*, 458.

Habitat: Costa Rica.

A24. *Pœcilia heteristia* Regan, Regan, 1909, 235.

### MOLLIENESIA Le Sueur.

Type: *Mollienesia latipinna* Le Sueur.

Range: South Carolina to Lake Peten.

1. *Mollienesia latipinna* Le Sueur, Meek, 155.

*Pœcilia multilineata* Le Sueur; *P. lineolata, Limia pœcilioides, formosa* and *matamorensis* Girard.

Habitat: Lowland streams from Yucatan to South Carolina.

2. *Mollienesia jonesi* Günther, J. & E., 689.

Habitat: Lake Alcohuaca and Huamantla, Mexico.

3. *Mollienesia petenensis* Günther, J. & E., 700.

Habitat: Lake Peten.

### XIPHOPHORUS Heckel.

Type: *Xiphophorus helleri* Heckel.

Range: Atlantic slope of Mexico and Guatemala.

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[1] = *sphenops* fide Regan.

1. *Xiphophorus helleri* Heckel, J. & E., 701.
   Habitat: Atlantic slope of Mexico and Guatemala.
2. *Xiphophorus guentheri* Jordan & Evermann, ...... ........J. & E., 702.
   Habitat: Rio Chisoy.
3. *Xiphophorus jalapæ* Meek,[1] .Meek, 156.
   Habitat: Central Vera Cruz.
4. *Xiphophorus montezumæ* Jordan & Snyder, ..................Meek, 158.
   Habitat: Rio Panuco Basin.
5. *Xiphophorus strigatus* Regan,
   Regan, 1907, 65.
   *X. helleri* Meek (*non* Heckel).
   Habitat: Southern Mexico, Vera Cruz and Oaxaca.
6. *Xiphophorus brevis* Regan,
   Regan, 1907–8, 108.
   Habitat: Stann Creek, British Honduras.

### ORESTIAS Valenciennes.

*Orestiasini, Orestiasiformes* Bleeker.
Type: *Orestias cuvieri* Valenciennes.
Range: Titicaca Basin; headwaters of Urubamba; Rio Rimac.

1. *Orestias cuvieri* Valenciennes,
   Garman, 147.
   *Orestias humboldti* Valenciennes; *O. pentlandi* Castelnau, *non* Valenciennes.
   Habitat: Lake Titicaca.
2. *Orestias pentlandi* Valenciennes,
   Garman, 148.
   *Orestias bairdii* Cope.
   Habitat: Lake Titicaca; Cuzco Valley.
3. *Orestias elegans* Garman, Garman, 149.
   Habitat: Small lakes in headwaters of Rio Rimac, 4,200 meters.
4. *Orestias mülleri* Valenciennes,
   Garman, 149.
   *Orestias luteus* Günther, (*non* Val.).
   Habitat: Lake Titicaca.
5. *Orestias agassizi* Valenciennes,
   Garman, 150.
   *Orestias tschudii* Castelnau; *O. owenii* Günther, in part; *O. ortoni* and *frontosus* Cope.
   Habitat: Lake Titicaca.
6. *Orestias owenii* Valenciennes,
   Garman, 152.
   Habitat: Lake Titicaca.
7. *Orestias albus* Valenciennes.
   *Orestias mülleri* Günther, in part.
   Habitat: Lake Titicaca.
8. *Orestias neveni* Pellegrin, .P., 1907, 24.
   Habitat: Lake Titicaca.
9. *Orestias olivaceus* Garman, Garman, 152.
   Habitat: Land-locked lake Umayo, nine miles northwest of Lake Titicaca and 100 feet higher.
10. *Orestias luteus* Valenciennes,
    Garman, 154.
    *Orestias mülleri* Günther, in part.
    Habitat: Lake Titicaca.
11. *Orestias jussiei* Valenciennes,
    Garman, 155.
    *Orestias jussieui* Castelnau.
    Habitat: Titicaca and Guasacona River; Lake Chinchoro near Cuzco.
12. *Orestias incæ* Garman, ..Garman, 155.
    Habitat: Lake Titicaca.
13. *Orestias tirapatæ* Boulenger,
    Boulenger, 1902, 153.
    Habitat: Andes of Eastern Peru.

### TOMEURUS Eigenmann.

Type: *Tomeurus gracilis* Eigenmann.
Range that of the single species.

1. *Tomeurus gracilis* Eigenmann.
   Habitat: Wismar and Aruka River, British Guiana.

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[1] According to Regan this is *helleri*.

## Family GALAXIIDÆ.[1]

### GALAXIAS Cuvier.

*Mesites* Jenyns.

Type: *Galaxias truttaceus* Cuvier.

1. **Galaxias attenuatus** (Jenyns).
   *Mesites gracillimus* Canestrini; *Galaxias minutus* Philippi; ? *G. punctatus* Philippi.
   Habitat: Southern Patagonia, Tierra del Fuego and Falkland Islands.
2. **Galaxias maculatus** (Jenyns).
   *Galaxias coppingeri* Günther; *Mesites attenuatus* Jenyns.
   Habitat: Puerto Montt, south to the Falkland Islands and St. Augustine.
3. **Galaxias platei** Steindachner.
   ? *Galaxias grandis* Philippi; *G. delfini* Philippi.
   Habitat: Southern Patagonia.
4. *Galaxias alpinus* (Jenyns).
   Habitat: Alpine lakes of Hardy Peninsula, Tierra del Fuego.
5. *Galaxias smittii* Regan.
   Habitat: Falkland Islands.
6. *Galaxias titcombi* Evermann & Kendall.
   Habitat: Rio Traful, Argentina.
7. **Galaxias bullocki** Regan, Regan, 1908*b*.
   Habitat: Southern Chili.

## Family APLOCHITONIDÆ.

### APLOCHITON Jenyns.

*Farionella* Cuvier & Valenciennes.

*Haplochiton* Günther.

Type: *Aplochiton zebra* Jenyns.

1. **Aplochiton zebra** Jenyns.
   *Farionella gayii* Cuvier & Valenciennes.
   Habitat: Puerto Montt and south to the Falkland Islands.
2. *Aplochiton tæniatus* Jenyns.
   Habitat: Southern Patagonia and Tierra del Fuego.

## Order SYNENTOGNATHI.

## Family BELONIDÆ.

### TYLOSURUS Cocco.

Type: *Tylosurus cantraini* Cocco = *T. acus* Lacépède.

Range: Marine, entering rivers.

1. *Tylosurus microps* (Günther), J. & E., 712.
   Habitat: Guiana.

A2. *Tylosurus amazonicus* (Steindachner), J. & E., 712.
   Habitat: Para; Manacapuru; Tajapuru.

A3. *Tylosurus almeida* (Quoy & Gaimard), J. & E., 715.
   *Belone timucu* Cuvier & Valenciennes; *B. truncata* and *guianensis* Günther, *non* Müller & Troschel.
   Habitat: Surinam to Rio de Janeiro.

4. *Tylosurus marinus* (Walbaum), J. & E., 714.
   *Esox longirostris* Mitchill; *Belone truncata* Le Sueur; *B. scrutator* Girard.
   Habitat: Cape Cod to Yucatan, entering rivers.
5. **Tylosurus fluviatilis** Regan, Regan, 1903, 626.
   Habitat: Rivers of northwestern Ecuador.
6. *Tylosurus scapularis* Jordan & Gilbert, J. & E., 711.
   Habitat: Panama.

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[1] For a detailed account of the Galaxiidæ see Section I of this report.

ATHLENNES Jordan & Fordice.

Type: *Belone hians* Cuvier & Valenciennes.

Range: Marine.

A1. *Athlennes hians* (Cuvier & Valenciennes), ............J. & E., 718.

*Belone maculata* Poey.

Habitat: West Indies to Bahia, entering rivers.

POTAMORRHAPHIS Günther.

Type: *Belone tæniata* Günther = *guianensis* Schomburgk.

Range that of the single species.

A1. *Potamorrhaphis guianensis* (Schomburgk),.........Günther, VI, 256.

*Belone scolopacina* Cuvier & Valenciennes; *Belone tæniata* Günther.

Habitat: Guiana to Paraguay.

## Order ACANTHOPTERÆ.

### Family MUGILIDÆ.

### Subfamily MUGILINÆ.

MUGIL Linnæus.

Type: *Mugil cephalus* Linnæus.

Range: Marine. In many seas.

1. **Mugil curema** Cuvier & Valenciennes, J. & E., 813.

*Mugil petrosus* C. & V.; *M. brasiliensis* Jordan & Gilbert.

Habitat: Both coasts, entering rivers.

2. *Mugil platanus* Günther, Günther, '80, 9.

Habitat: Rio de La Plata.

A3. *Mugil xinguensis* Steindachner, St., 1907*d*, 489.

Habitat: Xingu.

Several species of Mugil are found along the coasts of South America and most of them may be found entering fresh water.

### Subfamily AGONOSTOMINÆ.

AGONOSTOMUS Bennett.

Type: *Agonostomus telfairii* Bennett.

Range: Fresh waters of the West Indies; Central America; New Zealand; Australia; Celebes, etc.

(DAJAUS Cuvier & Valenciennes.)

(Type: *Dajaus monticola* Cuvier & Valenciennes).

1. *Agonostomus percoides* Günther, J. & E., 819.

Habitat: Fresh waters of Santo Domingo; Trinidad.

2. **Agonostomus monticola** Bancroft, J. & E., 819.

Habitat: West Indies to Trinidad; Atlantic and Pacific slope of Mexico and Central America.

3. **Agonostomus microps** Günther, J. & E., 820.

Habitat: Rio Guacalate.

4. *Agonostomus macracanthus* Regan, Regan, 1907, 65.

Habitat: Rio Guacalate, Guatemala.

5. *Agonostomus salvini* Regan, Regan, 1907, 66.

Habitat: Rio Nacasil, Guatemala.

6. **Agonostomus nasutus** Günther, G., III, 463.

*N. digneti* Vaill.

Habitat: Mountain torrents of Lower California to Costa Rica.

XENORHYNCHICHTHYS Regan.

Type: *Joturus stipes* Jordan & Gilbert.

Range that of the single species.

1. *Xenorhynchichthys stipes* (Jordan & Gilbert).
Habitat: Central America.

JOTURUS Poey.

Type: *Joturus pichardi* Poey.
1. *Joturus pichardi* Poey, ....J. & E., 821.
*Agonostoma globiceps* Günther.
Habitat: Cuba, in mountain streams.

## Family ATHERINIDÆ.[1]

PROTISTIUS Cope.

Type: *Protistius semotilus* Cope.
Range that of the single species.
1. **Protistius semotilus** Cope, ..1874, 66.
Habitat: Peruvian Andes. Elevation 12,000 feet.

GASTROPTERUS Cope.

*Pisciregia* Abbott.
Type: *Gastropterus archæus* Cope.
Range: Ocean to 7,500 feet.
1. **Gastropterus archæus** Cope,
Cope, 1878, 700.
Habitat: Arequipa, Pacific slope of Peru. Altitude 7,500 feet and ocean?
2. **Gastropterus beardsleei** Abbott.
Habitat: Coast of Peru.

ATHERINA Linnæus.

*Membras* Bonaparte.
Type: *Atherina hepsetus* Linnæus.
Range: Marine. Fresh waters of Cuba.
1. *Atherina evermanni* Eigenmann,
Eigenm., 1903.
Habitat: Western Cuba.

CHIROSTOMA Swainson.

*Atherinoides*, *Atherinichthys* Bleeker; *Heterognathus* Girard.
Type: *Atherina humboldtiana* Cuvier & Valenciennes.
Range: Mexico.

(ESLOPSARUM Jordan & Evermann.)

(Type: *Chirostoma jordani* Woolman.)

1. **Chirostoma jordani** Woolman,
Meek, 169.
*Chirostoma brasiliense* Jordan; *Atherinichthys brevis* Steindachner.
Habitat: Rio Lerma and the valley of Mexico.
2. **Chirostoma breve** Steindachner,
St., 1895, 526.
Habitat: Rio Lerma; valley of Mexico.
3. **Chirostoma mezquital** Meek,[2]
Meek, 170.
Habitat: Durango.
4. **Chirostoma arge** Jordan & Synder,
Meek, 171.
Habitat: Rio Lerma Basin.
5. **Chirostoma bartoni** Jordan & Evermann, ................Meek, 172.
Habitat: Rio Lerma Basin.
6. **Chirostoma attenuatum** Meek,[3]
Meek, 172.
Habitat: Rio Lerma Basin.
7. **Chirostoma labarcæ** Meek[1], Meek, 173.
Habitat: Rio Lerma Basin.
8. **Chirostoma patzcuaro** Meek,
Meek, 174.
Habitat: Rio Lerma Basin.
9. **Chirostoma zirahuen** Meek,[4]
Meek, 174.
Habitat: Rio Lerma Basin.

(CHIROSTOMA.)

10. **Chirostoma humboldtianum** (Cuvier & Valenciennes), ......Meek, 175.
*Atherina vomerina* C. & V.

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[1] *Atherinichthys argentinensis* C. & V., La Plata; *Odontesthes perugiæ* Evermann & Kendall, Argentina.

[2] = *jordani* fide Regan.

[3] = *bartoni* fide Regan.

[4] = *bartoni* fide Regan.

Habitat: Rio Lerma and valley of Mexico.

11. **Chirostoma chapalæ** Jordan & Snyder, Meek, 176.
Habitat: Rio Lerma Basin.

12. **Chirostoma grandoculis** Steindachner, Meek, 176.
Habitat: Rio Lerma Basin.

13. **Chirostoma promelas** Jordan & Snyder, .................. Meek, 177.
Habitat: Rio Lerma Basin.

### (LETHESTOLE Jordan & Evermann.)

(Type: *Chirostoma estor* Jordan.)

14. **Chirostoma diazi** Jordan & Snyder, J. & S., 1899, 137.
*Chirostoma sphyræna* Meek, *non* Boulenger.
Habitat: Rio Lerma Basin.

15. **Chirostoma sphyræna** Boulenger, Meek, 177.
*C. lermæ* J. & S.
Habitat: Rio Lerma Basin.

16. **Chirostoma lucius** Boulenger, Meek, 178.
*Chirostoma crystallinum* Jordan & Snyder.
Habitat: Rio Lerma Basin.

17. **Chirostoma ocotlane** Jordan & Snyder, Meek, 180.
*Chirostoma lucius* Boulenger, part.
Habitat: Rio Lerma Basin.

18. **Chirostoma estor** Jordan, . . Meek, 180.
*Atherinichthys albus* Steindachner.
Habitat: Rio Lerma and valley of Mexico.

### MENIDIA Bonaparte.

Type: *Atherina menidia* Linnæus.

Range: Marine. Many species in the Atlantic and Pacific of North and Central America.

1. *Menidia sallei* (Regan), . . . . Meek, 181.
Habitat: Mexico.

2. **Menidia guatemalensis** (Günther), J. & E., 801.
Habitat: Lakes of Guatemala.

3. **Menidia laticlava** (Cuvier & Valenciennes).
Habitat: Chili and Patagonia.

4. **Menidia mauleana** (Steindachner),
Habitat: Pichi Lagune, a branch of Lake Llanquihue.

5. *Menidia hatcheri* Eigenmann.
Habitat: Lake Pueyrredon.

### THYRINA Jordan & Culver.

*Melaniris* Meek.

Type: *Thyrina evermanni* Jordan & Culver.

Range: Pacific slope of Mexico.

1. **Thyrina guatemalensis** (Günther), Regan, 1907–8, 64.
*Th. evermanni* and *crystallina* Jordan & Culver; *Melaniris balsanus* Meek.
Habitat: Rio Presidio; Sinaloa.

2. *Thyrina meeki* Miller, . . . M., 1907, 110.
Habitat: Rio Montagua Basin, Guatemala.

3. *Thyrina sardina* Meek, Meek, 1907, 114.
Habitat: Lakes of Nicaragua.

### XENATHERINA Regan.

Type: *Menidia lisa* Meek.

Range that of the single species.

1. *Xenatherina lisa* (Meek), Regan, 1907–8, 64.

### ATHERINOPSIS Girard.

*Basilichthys* Girard.

Type: *Atherinopsis californiensis* Girard.

Range: California to Patagonia.

1. *Atherinopsis regius* (Humboldt).
*Atherina microlepidota* Jenyns.
Habitat: Callao to Gallegos and ? Montevideo, entering fresh waters.

2. *Atherinopsis bonariensis* (Cuvier & Valenciennes), Evermann & Kendall, 1906, 95.
   Habitat: Lakes of Argentina.

## Family POLYCENTRIDÆ.

POLYCENTRUS Müller & Troschel.

Type: *Polycentrus schomburgkii* Müller & Troschel.

Range: Guiana and Trinidad.

1. *Polycentrus schomburgkii* Müller & Troschel, .......... Günther, III, 370.
   Habitat: Essequibo; Orinoco; Trinidad.
2. *Polycentrus tricolor* Gill, Günther, III,370.
   Habitat:Trinidad.

MONOCIRRHUS Heckel.

Type: *Monocirrhus polyacanthus* Heckel.

Range that of the single species.

A1. *Monocirrhus polyacanthus* Heckel, Günther, III, 371.
   Habitat: Rio Cupai and ponds near the Rio Negro.

## Family CENTROPOMIDÆ.

CENTROPOMUS Lacépède.

*Oxylabrax* Bleeker; *Macrocephalus* Brown.

Type: *Sciæna undecimalis* Bloch.

Range: Marine. Some, possibly all, of the species entering or living in fresh water.

A1. **Centropomus medius** Günther, J. & E., 1119.
   *C. grandoculatus* E. & J.; *C. pedimacula* part J. & E.
   Habitat: Atlantic and Pacific coasts, entering rivers.

A2. **Centropomus parallelus** Poey, J. & E., 1122.
   *C. gabbi* and *heringi* Fowler; *C. mexicanus* Bocourt.
   Habitat: Cuba to Bahia; Pacific coast, entering rivers.

3. **Centropomus undecimalis** (Bloch), J. & E., 1118.
   *C. undecimradiatus, boubina* and *aureoviridis* Lacépède; *C. argenteus* Regan; *C. appendiculatus* Poey.
   Habitat: Atlantic coast, entering rivers.

A4. *Centropomus pectinatus* Poey, J. & E., 1122.
   *C. pedimacula* Poey.
   Habitat: Cuba to Pernambuco, entering rivers.

5. **Centropomus nigrescens** Günther, Regan, 50.
   Habitat: Rio Presidio to Panama.

6. **Centropomus robalito** Jordan & Gilbert, J. & E., 1123.
   *C. armatus* Günther, *non* Gill.
   Habitat: Pacific coast from Mazatlan to Panama, entering rivers.

7. **Centropomus armatus** Gill, Regan, 1903, 627.
   *C. atridorsalis* Regan; *C. brevis* Günther.
   Habitat: Rio Vaqueria near La Tola, northwestern Ecuador.

8. *Centropomus ensiferus* Poey, Regan, 1906*c*, 391.
   *C. affinis* Steind.; *C. scaber* Bocourt.
   Habitat: Guiana.

### Family SERRANIDÆ.[1]

#### PERCICHTHYS Girard.

Type: *Perca trucha* Cuvier & Valenciennes.

Range: Valparaiso to the Rio Negro.

1. **Percichthys trucha** (Cuvier & Valenciennes).
   *Perca lævis* Jenyns; *Percichthys chilensis* Girard.
   Habitat: South of Santiago and the Rio Negro of Patagonia.
2. **Percichthys melanops** Girard.
   *Perca pocha* Philippi.
   Habitat: Santiago to Curico, Chili.
3. *Percichthys altipinnis* Regan.
   Habitat: Rio Colorado, Buenos Aires.
4. *Percichthys vinciguerræ* Perugia.
   Habitat: Rio Santa Cruz.

#### PERCILIA Girard.

Type: *Percilia gillissii* Girard.

Range that of the single species.

1. **Percilia gillisii** Girard.
   Habitat: Central Chili.

### Family HÆMULIDÆ.

#### POMADASIS Lacépède.

*Pristopoma* Oken; *Rhencus* and *Rhoniscus* Jordan & Evermann.

Type: *Pomadasis argenteus* Lacépède.

Range: Marine. Tropical seas, entering rivers.

1. *Pomadasis boucardi* Steindachner, Regan, 1907–8, 43.
   *P. templei* Meek.
   Habitat: Rio Panuco, east coast.
2. **Pomadasis bayanus** Jordan & Evermann, .............. J. & E., 1331.
   *Pristipoma humile* Kner & Steindachner, *non* Bowditch; *Pristipoma labiaciforme* Boulenger.
   Habitat: Rio Bayano, near Panama.
3. **Pomadasis andrei** (Sauvage), J. & E., 1332.
   Habitat: Rio Guayas, near Guayaquil.

A4. *Pomadasis crocro* (Cuvier & Valenciennes), .......... J. & E., 1333.
   *Pristipoma cultriferum* Poey; *Pomadasys approximans* Bean & Dressel; *P. starri* Meek.
   Habitat: West Indies; São Matheos; Itabapuana; Cannavierias.

5. *Pomadasis grandis* Meek, Meek, 1907, 116.
   Habitat: Lake Nicaragua.
6. **Pomadasis branicki** (Steindachner), J. & E., 1333.
   Habitat: Mazatlan to Peru, entering rivers.
7. **Pomadasis macracanthus** Günther, Regan, 1907–8, 42.
   Habitat: Rio Presidio to Panama.
8. **Pomadasis leuciscus** Günther, Regan, 1907–8, 42.
   Habitat: California to Peru.

### Family SCIÆNIDÆ.

#### APLODINOTUS Rafinesque.

Type: *Aplodinotus grunniens* Rafinesque.

1. *Aplodinotus grunniens* Rafinesque.
   Habitat: Chiapas, Mexico, northward through the Mississippi valley.

#### PLAGIOSCION Gill.

*Diplolepis* Steindachner.

Type: *Sciæna squamosissima* Heckel.

Range: Rivers of the eastern slope of South America from the Magdalena to the La Plata.

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[1] For details see the Patagonian section of this report.

A1. *Plagioscion squamosissimus* (Heckel), J. & E., 1418.
*Sciæna rubella* Schomburgk; *Johnius crouvina* and *amazonicus* Castelnau; *Corvina monacantha* Cope.
Habitat: Brazil and Guiana.

2. *Plagioscion heterolepis* (Bleeker), J. & E., 1419.
Habitat: Surinam.

3. *Plagioscion ternetzi* Boulenger, Boulenger, 1896, 25.
Habitat: Paraguay Basin.

A4. *Plagioscion surinamensis* (Bleeker), J. & E., 1419.
*Sciæna magdalenæ* Steindachner.
Habitat: Rio Magdalena to Para.

A5. *Plagioscion auratus* Castelnau, Günther, II, 281.
Habitat: Rivers of Brazil.

### PACHYURUS Agassiz.

*Lepipterus* Cuvier & Valenciennes.
Type: *Pachyurus squamipinnis* Agassiz.
Range: Amazons; Paraguay; Rio San Francisco.

A1. *Pachyurus squamipinnis* Agassiz, Jordan & Eigenmann, 1889, 69.
*Pachyurus lundii* Reinhardt.
Habitat: Rio San Francisco and tributaries; Para.

2. *Pachyurus francisci* (Cuvier & Valenciennes), Jordan & Eigenmann, 1889, 412.
*Pachyurus corvina* Reinhardt.
Habitat: Rio San Francisco and tributaries.

3. *Pachyurus bonariensis* Steindachner, Jordan & Eigenmann, 1889, 412.
*Sciæna adusta* Hensel.
Habitat: La Plata Basin; Rio Grande do Sul.

A4. *Pachyurus schomburgki* Günther, Jordan & Eigenmann, 1889, 412.
*Pachyurus nattereri* Steindachner.
Habitat: Amazons and tributaries; Paraguay.

### PACHYPOPS Gill.

Type: *Micropogon trifilis* Müller & Troschel.
Range: Guiana to the Guaporé and southeastern Brazil.

A1. *Pachypops furcræus* (Lacépède), Jordan & Eigenmann, 1889, 413.
*Corvina biloba* Cuvier & Valenciennes.
Habitat: Rivers of Brazil and Guiana.

A2. *Pachypops trifilis* (Müller & Troschel), Jordan & Eigenmann, 1889, 413.
Habitat: Rio Guaporé to Guiana.

3. *Pachypops adspersus* (Steindachner), Jordan & Eigenmann, 1889, 414.
*Corvina grunniens* Schomburgk.
Habitat: Southeastern Brazil.

## Family PERCIDÆ.

### ETHEOSTOMA Rafinesque.

Type: *Etheostoma flabellare* Rafinesque.
Range: Rio Mezquital north through Atlantic slope of America.

(RAFINESQUIELLUS Jordan & Evermann.)
(Type: *Aplesion pottsii* Girard.)

1. **Etheostoma pottsii** (Girard), Meek, 197.
*Etheostoma micropterus* Gilbert.
Habitat: Headwaters of Rio Mezquital (Pacific slope), and Rio Conchos and Rio Nazas (Atlantic slope).

## Family CICHLIDÆ.[1]

### CHÆTOBRANCHUS Heckel.

Type: *Chætobranchus flavescens* Heckel.

Range: Guiana to the Guaporé.

A1. *Chætobranchus flavescens* Heckel, Pellegrin, 164.

*Chætobranchus brunneus* Heckel; *Chromys ucayalensis* Castelnau; *Chætobranchus robustus* Günther; *Geophagus badiipinnis* Cope.

Habitat: Amazons, north to Guiana and south to the Guaporé.

A2. *Chætobranchus semifasciatus* Steindachner, ............Pellegrin, 165.

Habitat: Amazons.

### CHÆTOBRANCHOPSIS Steindachner.

Type: *Chætobranchopsis orbicularis* Steindachner.

Range: Amazon and Paraguay.

A1. *Chætobranchopsis orbicularis* Steindachner, ...........Pellegrin, 165.

Habitat: Amazons.

2. *Chætobranchopsis australis* Eigenmann & Ward, ............E., 1907*c*, 144.

Habitat: Paraguay.

### CICHLA Bloch & Schneider.

Type: *Cichla ocellaris* Bloch & Schneider.

Range: Guianas to Argentina; not in southeast Brazil.

A1. *Cichla ocellaris* Bloch & Schneider, Pellegrin, 148.

*Cichla monoculus* Agassiz; *C. atabapensis* Humboldt; *? C. orinocensis* Humboldt; *C. argus* Valenciennes; *Cychla nigro-maculata* and *trifasciata* Schomburgk; *Acharnes speciosus* Müller & Troschel; *Cichla toucounarai* and *? multifasciata* Castelnau; *Crenicichla orinocensis* Günther.

Habitat: Amazons and northward.

A2. *Cichla temensis* Humboldt, Pellegrin, 149.

*Cichla tucunare* Heckel; *Cychla flavomaculata* Schomburgk; *? Cichla conibos* Castelnau.

Habitat: Orinoco; Amazons.

3. *Cichla niederleinii* (Holmberg), Holmberg, 1891, 181.

Habitat: Rio Pequiri, Misiones, Argentina.

4. *Cichla chacoensis* (Holmberg), Holmb., 1891, 182.

Habitat: Formosa, Chaco, Argentina; Rio Paraguay and tributaries.

### UARU Heckel.

Type: *Uaru amphiacanthoides* Heckel.

Range: Guiana and Amazon.

A1. *Uaru amphiacanthoides* Heckel, Pellegrin, 212.

*Pomotis fasciatus* Schomburgk; *Uaru obscurum* Günther.

Habitat: Amazons; ? Guiana.

A2. *Uaru imperialis* (Steindachner), Pellegrin, 213.

Habitat: Amazon near the Rio Negro.

### HEROTILAPIA Pellegrin.

Type: *Heros multispinosus* Günther.

Range that of the single species.

1. *Herotilapia multispinosa* (Günther), Pellegrin, 211.

Habitat: Lake Managua.

### PARANEETROPLUS Regan.

Type: *Paraneetroplus bulleri* Regan.

Range that of the single species.

1. *Paraneetroplus bulleri* Regan, R., 1905, 436.

Habitat: Rio de Sarabia, Mexico.

### NEETROPLUS Günther.

Type: *Neetroplus-nematopus* Günther.

Range: Eastern slope of Mexico and Central America.

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[1] For the details of this family see Pellegrin, 1904, and various papers by Regan, 1904 and 1905.

1. *Neetroplus nematopus* Günther, Pellegrin, 209.

*Neetroplus nicaraguensis* Gill and Bransford.

Habitat: Lakes Managua and Nicaragua.

### ACAROPSIS Steindachner.

Type: *Acara nassa* Heckel.

Range that of the single species.

A1. *Acaropsis nassa* (Heckel), Pellegrin, 144.

Habitat: Guiana; Orinoco and Amazons.

### PETENIA Günther.

Type: *Petenia splendida* Günther.

Range that of the single species.

1. *Petenia splendida* Günther, Pellegrin, 207.

Habitat: Lake Peten.

### TOMOCICHLA Regan.

Type: *Tomocichla underwoodi* Regan.

Range that of the single species.

1. *Tomocichla underwoodi* Regan, Regan, 1908*d*, 463.

Habitat: Costa Rica.

### HERICHTHYS Baird & Girard.

Type: *Herichthys cyanoguttatus* Baird & Girard.

Range: Texas to Guatemala.

1. *Herichthys cyanoguttatus* Baird & Girard, .............J. & E., 1537.

*Neetroplus carpintis* Jordan & Snyder; *Heros temporatus* Fowler.

Habitat: Texas to northeastern Mexico.

2. *Herichthys bocourti* Vaill. & Pell., Pellegrin, 1903, 246.

Habitat: Guatemala.

3. *Herichthys geddesi* Regan, Regan, 1905, 436.

Habitat: Southern Mexico.

### ASTRONOTUS Swainson.

*Acara* Heckel restricted by Gill to *crassispinis* = *ocellatus*.

Type: *Lobotes ocellatus* Agassiz.

Range: Guiana to Peru and Paraguay.

A1. *Astronotus ocellatus* (Agassiz), Pellegrin, 146.

*Acara crassispinis* Heckel; *Cychla rubro-ocellata* Schomburgk; *Acara compressus* and *? hypostictus* Cope.

Habitat: Guiana, Amazons and Paraguay.

A2. *Astronotus ocellatus zebra* Pellegrin, Pellegrin, 147.

Habitat: Santarem.

A3. *Astronotus hypostictus* Cope, Pellegrin, 146.

Habitat: Marañon.

### NANNACARA Regan.

Type: *Nannacara anomala* Regan.

Range that of the single species.

1. *Nannacara anomala* Regan, Regan, 1905, 344.

Habitat: Essequibo.

### ÆQUIDENS Eigenmann & Bray.[1,2]

Type: *Acara tetramerus* Heckel.

Range: Panama to the La Plata and western Ecuador.

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[1] *? A. filamentosus* (Lacépède) and *A. planifrons* (Kaup).

[2] In 1839 Swainson (Nat. Hist. Fishes, Amph. and Rept., II) defined the genera *Astronotus* (p. 229) and *Cichlasoma* (p. 230). The types and only species of the genera are *Lobotes ocellatus* Agassiz and *Sciæna punctata* Linnæus.

In 1840 Heckel defined his new genus *Acara*. It included the type of Swainson's *Astronotus* under the new name *crassispinis* and also that of *Cichlasoma*. He did not indicate a type, and he grouped the species as follows, describing the first thirteen in detail.

A.

*Acara margarita* = *Cichlasoma bimaculatum.*
*Acara tetramerus* = *Æquidens tetramerus*

A1. *Æquidens tetramerus* (Heckel), Pellegrin, 135.

*? Sciæna punctata* Linnæus; *Acara viridis, diadema, pallidus* and *dimerus* Heckel; *Chromys punctata* and *uniocellata* Castelnau.

Habitat: Essequibo; Amazons south to Rio Janeiro and Paraguay.

B.

*Acara viridis* = *Æquidens tetramerus.*
*Acara diadema* = *Æquidens tetramerus.*
*Acara vittatus* = *Æquidens vittatus.*

C.

*Acara pallidus* = *Æquidens tetramerus.*
*Acara dorsigerus* = *Æquidens dorsigerus.*
*Acara marginatus* = *Cichlasoma bimaculatum.*
*Acara dimerus* = *Æquidens tetramerus.*

D.

*Acara nassa* = *Acaropsis nassa.*
*Acara cognatus* = *Acaropsis nassa.*
*Acara unicolor* = *Acaropsis nassa.*

E.

*Acara crassispinis* = *Astronotus ocellatus.*

Heckel enumerates as other species belonging to this genus:

*Acara niloticus* = *Tilapia nilotica.*
*Acara punctatus* = *Cichlasoma punctatum.*
*Acara gronovii* = *Cichlasoma bimaculatum.*
*Acara brasiliensis* = *Geophagus brasiliensis.*
*Acara tænia* = *Cichlasoma bimaculatum.*
*Acara surinamensis* = *Geophagus surinamensis.*
*Acara desfontainii* = *Astatotilapia desfontainii.*
*Acara ocellatus* = *Astronotus ocellatus.*

Inasmuch as the species described by Heckel included members of four distinct genera and since he added members of three other genera from species known to him from descriptions, we cannot say that he had any very definite thing in mind when he framed the genus.

In the generic description he refers to figures of the lower pharyngeals and gill-arches of *Acara tetramerus* and *crassispinis.*

As far as Heckel's work is concerned, his *Acara,* containing the type of Swainson's *Astronotus* (to the figure of which Heckel definitely refers in his generic description) might be a synonym of *Astronotus* or separate from it, depending altogether on which of his species, if any, he considered his type. If any presumption is permitted, it must be in favor of his first species or the last, or one of the species whose figures are referred to in his generic description. The first species is a synonym of *Sciæna bimaculata* Linnæus and belongs to the genus *Cichlasoma* of Swainson. If the first species is selected, the name *Acara* becomes a synonym of *Cichlasoma.* If the last species, *crassispinis,* is selected, *Acara* becomes a synonym of *Astronotus,* since *crassispinis* is a synonym of *ocellatus,* the type of the latter genus. If one of the two species figured is selected we may have *tetramerus* or again *crassispinis* as the type for *Acara.* If the former is selected the name *Acara* will stand.

Inasmuch as Heckel does not select a type, it is incumbent on a later naturalist to select a type from among the four species discussed, or from among any of Heckel's species.

In the earliest paper by Gill (Synopsis of the Fresh-Water Fishes of Trinidad) he says, p. 19: "As it [*Labrus punctatus,* the type of *Cichlasoma*] is a true *Acara,* the latter genus is consequently synonymous with *Cychlasoma,* and in accordance with the law of priority, the Swainsonian name must be adopted as that of the present genus." Gill re-defines the genus *Cichlasoma,* excluding several of Heckel's species, and continues: "With these characters, that species which Mr. Heckel . . . has described as the *Acara crassispinis,* will also be excluded [from the genus *Cichlasoma*]; this species appears to be generically distinct from both *Cychlasoma* and from *Astronotus* of Swainson. . . . If it should be found, on a more critical examination, to be really distinct from *Astronotus,* to which it is most nearly allied, Heckel's name of *Acara* might appropriately be retained as its generic name. . . . It belongs to the section E of the genus *Acara,* in the arrangement of Heckel . . .; the other sections . . . all belong to *Cychlasoma* as now restricted."

Gill thus removed from *Acara* all of Heckel's species but *crassispinis.*

There can be no question that it was entirely within the province of Gill to restrict the genus to this species. But it was found later that *crassispinis* is a synonym of *ocellatus,* the type of *Astronotus. Acara* is therefore the exact synonym of *Astronotus* and cannot be used for anything else. Inasmuch as *tetramerus* and other species are distinct from *Astronotus,* I coined the name *Æquidens* for them in 1894. (Ann. N. Y. Acad. Sci., VII, 616, using the *Acara tetramerus* Heckel as type.)

The name *Acara* has been resurrected by Regan (Ann. and Mag. Nat. Hist. (7), XV, 1905, p. 330), who says: "After removing from Heckel's genus the species which belong to *Astronotus, Cichlasoma* and *Acaropsis,* I use *Acara* for the remainder, regarding Gill's restriction of the name *Acara* to a species which was already the type of another genus as invalid."

I know of no rule, ancient or modern, of scientific nomenclature which authorizes anyone to regard as invalid the work done by someone else, unless that work was done contrary to the accepted canons. In fact, the rules (if I am not mistaken) have been made especially to prevent this sort of procedure.

2. *Æquidens centralis* (Holmberg), Pellegrin, 136.
Habitat: Santiago del Estero, Argentina.

3. *Æquidens portalegrensis* (Hensel), Pellegrin, 137.
Habitat: Porto Alegre, Rio Grande do Sul; Paraguay.

A4. *Æquidens vittatus* (Heckel), Pellegrin, 137.
Habitat: Colombia to Guiana; Amazons and Paraguay.

A5. *Æquidens syspilus* (Cope), Pellegrin, 137.
Habitat: Upper Amazons.

A6. *Æquidens dorsigerus* (Heckel), Pellegrin, 138.
Habitat: Paraguay; Amazons.

7. *Æquidens paraguayensis* Eigenmann & Kennedy, .......... Pellegrin, 139.
Habitat: Paraguay.

A8. *Æquidens flavescens* (Cope), Regan, 1905, 343.
Habitat: Ambyiacu.

A9. *Æquidens thayeri* (Steindachner), Pellegrin, 139.
Habitat: Amazons (Lago Maximo; Hyanuary; Teffé).

10. *Æquidens pulcher* (Gill), Pellegrin, 140.
Habitat: Rio Magdalena to Trinidad.

11. **Æquidens cœruleopunctatus** (Kner & Steindachner).
*Acara latifrons* Steindachner.
Habitat: Rio Chagres; northwestern Ecuador.

12. *Æquidens latifrons* (Steindachner), Pellegrin, 141.
Habitat: Rio Magdalena.

13. **Æquidens equinoctialis** (Regan), Regan, 1905, 337.
Habitat: Western Ecuador.

14. **Æquidens rivulatus** (Günther), Pellegrin, 141.
*Acara pulchra* Günther, *non* Gill.
Habitat: Western Ecuador.

15. *Æquidens sapayensis* Regan.
Habitat: Western Ecuador.

16. *Æquidens freniferus* (Cope), Pellegrin, 141.
Habitat: Ambyiacu.

A17. *Æquidens minutus* (Hensel),[1] Pellegrin, 142.
Habitat: Porto Alegre, Rio Grande do Sul.

18. *Æquidens geayi* (Pellegrin), Pellegrin, 142.
Habitat: River Camopi, French Guiana.

A19. *Æquidens subocularis* (Cope), Pellegrin, 189.
*Geophagus* (*mesops*) *thayeri* Steindachner.
Habitat: Amazons.

20. *Æquidens maronii* (Steindachner), Pellegrin, 143.
Habitat: French Guiana.

A21. *Æquidens zamorensis* (Regan), Regan, 1905, 339.
Habitat: Ecuadorian Amazons.

### THORICHTHYS Meek.

Type: *Thorichthys ellioti* Meek.
Range: Eastern slope of Mexico and Central America.

1. *Thorichthys aureus* (Günther), Pellegrin, 202.
*Heros maculipinnis* and *helleri* Steindachner.
Habitat: Eastern Mexico, south of Vera Cruz; Guatemala.

2. *Thorichthys ellioti* Meek, .... Meek, 223.
Habitat: Vera Cruz, Mexico.

3. *Thorichthys callolepis* Regan, Regan, 1904, 258.
Habitat: Santo Domingo de Guzman.

4. *Thorichthys affinis* (Günther).
Habitat: Guatemala and British Hon-

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[1] Regan considers this the young of *Geophagus gymnogenys* Hensel.

duras; Lake Peten; Belize; Lake Floris.

CICHLASOMA Swainson.[2]

Type: *Sciæna bimaculata* Linnæus.

Range: Mexico to La Plata; on both slopes of Central America. Chiefly in middle America, few in South America.

(1. *Cichlasoma* Swainson.)

A1. *Cichlasoma bimaculatum* (Linnæus), Regan, 68.
*Labrus punctatus* Linnæus, part; *Chromis tænia* Bennet; *Acara gronovii, margarita* and *marginatus* Heckel.
Habitat: Paraguay to Trinidad; Amazon.

(2. *Mesonauta* Günther.)

(Type: *Heros festivus* Heckel.)

2. *Cichlasoma festivum* (Heckel), Regan, 69.
*Heros insignis* Heckel; *Chromys acora* Castelnau.
Habitat: Paraguay to Orinoco.

(3. ———.)

3. *Cichlasoma facetum* (Jenyns), Pellegrin, 181.
*Heros jenynsii* Steindachner; *Heros acaroides* Hensel.
Habitat: La Plata Basin.

4. *Cichlasoma autochthon* (Günther), Pellegrin, 199.
La Plata Basin; southeastern Brazil.

A5. *Cichlasoma oblongum* (Castelnau), Pellegrin, 200.
Habitat: Province Goyaz.

6. *Cichlasoma globosum* Miller, Miller, 1907, 114.
Habitat: Motagua Basin.

7. *Cichlasoma mañana* Miller, Miller, 1907, 115.
Habitat: Motagua Basin.

8. *Cichlasoma acutum* Miller, Miller, 1907, 117.
Habitat: Motagua Basin.

9. *Cichlasoma milleri* Meek, Meek, 1907*a*, 142.
Habitat: Motagua Basin.

(4. ———.)

A10. *Cichlasoma temporale* (Günther), Pellegrin, 182.
*Acara crassa* Steindachner; *Heros gœldii* Boulenger.
Habitat: Amazons; Guiana.

A11. *Cichlasoma coryphænoides* (Heckel), Pellegrin, 183.
*Heros niger* Heckel.
Habitat: Amazons.

12. *Cichlasoma biocellatum* Regan, Regan, 1909, 234.
Habitat: Costa Rica.

(5. *Archocentrus* Gill.)

(Type: *Heros centrarchus* Gill & Bransford.)

13. **Cichlasoma nigrofasciatum** (Günther), ............. Pellegrin, 187.
Habitat: Lakes Atitlan, Amatitlan and Guatemala.
*Cichlasoma octofasciatum* Regan; *C. hedricki* Meek, ........ Regan, 331.
Habitat: Southern Mexico to British Honduras.

14. *Cichlasoma spilurus* (Günther), Pellegrin, 186.
Habitat: Guatemala in Rio Motagua; Lake Yzabal.

15. *Cichlasoma septemfasciatum* Regan, Regan, 1908*d*, 461.
Habitat: Costa Rica.

16. *Cichlasoma spinosissimum* Vaillant & Pellegrin, .......... Pellegrin, 188.

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[2] I largely follow Regan (Ann. and Mag. Nat. Hist. (7), XVI, pp. 60–77, 225–243, 316–340, but retain *Thorichthys* as a distinct genus.

Habitat: Rio Polochic, Guatemala.

17. *Cichlasoma immaculatum* Pellegrin, Regan, 77.

Habitat: Rio Polochic.

18. *Cichlasoma centrarchus* (Gill & Bransford), ............Pellegrin, 188.

Habitat: Lake Nicaragua.

(6. *Theraps* Günther.)

(Type: *Theraps irregularis* Günther.)

19. *Cichlasoma zonatum* Meek, . Meek, 245.

Habitat: Niltepec, Oaxaca.

20. *Cichlasoma eigenmanni* (Meek), Regan, 225.

Habitat: Rio Papaloapam.

21. *Cichlasoma nebuliferum* (Günther), Regan, 226.

*Cichlasoma teapæ* Evermann & Goldsborough; *Heros gibbiceps* Steind.

Habitat: Eastern lowland streams of the Isthmus of Tehuantepec; Teapa, Mexico.

22. *Cichlasoma parma* (Günther), Regan, 227.

*Cichlasoma maculicauda* Regan.

Habitat: Rio Chagres; Rio Motagua; Lake Yzabal.

23. *Cichlasoma fenestratum* (Günther), Regan, 227.

*Heros parma* (part) Günther; *Cichlasoma melanurum* (part) Meek.

Habitat: Southern Mexico and Guatemala.

24. *Cichlasoma nigritum* Meek, M., 1907, 128.

Habitat: Nicaragua.

25. *Cichlasoma bifasciatum* (Steindachner), ................Regan, 228.

Habitat: Mexico.

26. **Cichlasoma guttulatum** Günther, Regan, 229.

Habitat: Lake Peten, Lake Amatitlan, Rio Chinantla; Lake Nacasil; Rio Sarabia.

27. *Cichlasoma microphthalmus* Günther, Regan, 230.

*Cichlasoma güntheri* Pellegrin; *C. oblongum* Günther, *non* Castelnau.

Habitat: Rio Motagua.

28. *Cichlasoma sexfasiatum* Regan, Regan, 230.

Habitat: Guapote, Mexico.

29. *Cichlasoma melanurus* (Günther), Regan, 231.

*Heros melanopogon* Steindachner.

Habitat: Vera Cruz to Lake Peten.

30. *Cichlasoma labridens* Pellegrin, Regan, 443.

*Cichlasoma bartoni* (*non* Bean) Meek (part).

Habitat: Rio Panuco and tributaries, Mexico.

31. *Cichlasoma gadovii* Regan, Regan, 232.

*? C. melanurum* (*non* Günther) Meek.

Habitat: Motzorongo, southern Mexico.

32. *Cichlasoma intermedium* (Günther), Regan, 232.

*Acara rectangularis* Steindachner.

Habitat: Yzabal and Lake Peten; Mexico.

33. *Cichlasoma anguliferum* Günther.

Habitat: Guatemala.

34. *Cichlasoma pavonaceum* Garman, Regan, 234.

Habitat: Monclova, Coahuila, Mexico.

35. *Cichlasoma sieboldii* (Kner & Steindachner), ............Regan, 235.

Habitat: Panama; Colombia.

36. *Cichlasoma deppii* (Heckel), Pellegrin, 179.

*? Heros montezuma* Heckel.

Habitat: Mexico, Vera Cruz.

37. **Cichlasoma godmanni** (Günther), Regan, 235.

Habitat: Rio Cahabon (Atlantic Slope) and west slope of Panama.

38. *Cichlasoma irregulare* (Günther), Regan, 236

Habitat: Guatemala, Atlantic slope.

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39. *Cichlasoma lentiginosum* (Steindachner), ..............Pellegrin, 181.
Habitat: Mexico.

(7. ———.)

40. *Cichlasoma balteatum* (Gill & Bransford), .............. Regan, 238.
Habitat: Lake Nicaragua.

41. *Cichlasoma nicaraguense* (Günther), Regan, 238.
Habitat: Lake Nicaragua.

42. *Cichlasoma alfari* Meek, Meek, 1907*a*, 148.
Habitat: Costa Rica.

(8. *Astotheros* Pellegrin.)

(Type: *Heros heterodontus* Vaillant & Pellegrin.)

43. *Cichlasoma robertsoni* Regan, Regan, 239.
Habitat: Stann Creek, British Honduras.

44. *Cichlasoma longimanus* (Günther), Regan, 240.
Habitat: Lake Nicaragua.

45. **Cichlasoma macracanthus** (Günther), ...............Regan, 241.
Habitat: Chiapam and Huamuchal.

46. *Cichlasoma heterodontum* Vaillant & Pellegrin, ............Regan, 241.
Habitat: Isthmus of Tehuantepec.

47. *Cichlasoma evermanni* Meek, Meek, 214.
Habitat: Tehuantepec and Niltepec, Mexico.

48. **Cichlasoma altifrons** (Kner & Steindachner), ............Regan, 242.
Habitat: Pacific rivers of Chiriqui (western Veragua).

49. *Cichlasoma lithrinus* Regan, Regan, 1908*d*, 462.
Habitat: Costa Rica.

50. *Cichlasoma rostratum* (Gill & Bransford), ...............Regan, 243.
Habitat: Lake Nicaragua.

(9. *Erythrichthys* Meek.)

51. **Cichlasoma margaritiferum** (Günther), ...............Regan, 316.
Habitat: Lake Peten; Rio Polochic, Le Mullin.

52. *Cichlasoma citrinellum* Günther, Regan, 316.
*Heros lobochilus* (part) Günther; *Heros basilaris* Gill & Bransford.
Habitat: Lake Nicaragua and Lake Managua.

53. *Cichlasoma granadense* Meek, Meek, 1907, 121.
Habitat: Nicaragua.

(10. ———.)

54. *Cichlasoma dorsatum* Meek, Meek, 1907, 123.
Habitat: Nicaragua.

55. *Cichlasoma erythræum* Günther, Regan, 318.
Habitat: Lake Managua.

56. *Cichlasoma lobochilum* Günther, Regan, 318.
Habitat: Lake Managua.

57. *Cichlasoma labiatum* Günther, Regan, 319.
Habitat: Lakes Managua and Nicaragua.

(11. *Heros* Heckel.)

(Type: As restricted by Jordan & Gilbert, *Heros severus* Heckel.)

A58. *Cichlasoma severum* (Heckel) Regan, 322.
*Heros spurius, coryphæus, modestus, efasciatus* Heckel; *Chromys appendiculata* and *fasciata* Castelnau; *Uarus centrarchoides* Cope.
Habitat: Amazons; Guiana; Parahyba.

(12. *Hoplarchus* Kaup.)

(Type: *Hoplarchus pentacanthus* Kaup).

A59. *Cichlasoma psittacus* Heckel, Regan, 323.
*Hoplarchus pentacanthus* Kaup; *Pomotis fasciatus* Schomburgk.
Habitat: Rios Negro and Orinoco.

(13. *Parapetenia* Regan.)
(Type: *Acara adspersa* Günther.)

60. *Cichlasoma adspersum* (Günther), Regan, 324.
Habitat: Barbadoes.

61. *Cichlasoma tetracanthus* (Cuvier & Valenciennes), .......... Regan, 325.
*Chromis fusco-maculatus* Guichenot.
Habitat: Cuba.

62. *Cichlasoma torralbasi* Eigenmann, Eigenmann, 1903, 230.
Habitat: Almendares River, Cuba.

63. *Cichlasoma griseum* Eigenmann, Eigenmann, 1903, 232.
Habitat: San Antonio de las Baños, Cuba.

64. *Cichlasoma latum* Eigenmann, Eigenmann, 1903, 233.
Habitat: San Juan River, Cuba.

65. *Cichlasoma cinctum* Eigenmann, Eigenmann, 1903, 234.
Habitat: Paso Real, Cuba.

66. *Cichlasoma nigricans* Eigenmann, Eigenmann, 1903, 235.
Habitat: Pinar del Rio.

67. **Cichlasoma istlanum** Jordan & Snyder, ................ Regan, 326.
Habitat: Basin of Rio Balsas.

68. *Cichlasoma steindachneri* (Jordan & Snyder), ............. Regan, 444.
Habitat: Basin of the Rio Panuco, Mexico.

69. *Cichlasoma bartoni* (Bean), Regan, 327.
Habitat: Basin of the Rio Panuco, Mexico.

70. **Cichlasoma beani** Jordan, Regan 328.
Habitat: Rio Presidio, near Mazatlan; Rosario; Sinaloa (northernmost or Pacific coast?).

71. *Cichlasoma mento* Vaillant & Pellegrin, Regan, 329.
Habitat: Rio Negro, southern Mexico.

72. **Cichlasoma festæ** Boulenger, Regan, 329.
Habitat: Rio Durango; Rio Guayas, Ecuador.

73. **Cichlasoma ornatum** Regan, Regan, 331.
Habitat: Rio Durango; St. Javier, northwest Ecuador.

74. *Cichlasoma urophthalmus* Günther, Regan, 332.
*Heros troscheli* Steindachner.
Habitat: Yucatan; Belize; Lake Peten.

75. **Cichlasoma trimaculatum** Günther, Regan, 333.
Habitat: Chiapam and Huamuchal.

76. *Cichlasoma salvini* Günther, Regan, 334.
*Heros triagramma* Steindachner.
Habitat: Lakes Peten, Santa Yzabal; Rio Mullins, Guatemala; Motzorongo, Refugio, El Huele, Perez and Obispo, Mexico.

77. *Cichlasoma mojarra* Meek, .. Meek, 217.
Habitat: San Geronimo and Miltepec, Oaxaca, Mexico.

78. *Cichlasoma multifasciatum* Regan, Regan, 335.
*Heros friedrichsthalii* (part) Günther.
Habitat: Guatemala; British Honduras.

79. *Cichlasoma friederichsthali* (Heckel), Miller, 1906.
*Heros motaguensis* and *managuensis* Günther.[1]
Habitat: Nicaragua; Honduras; Lake Peten.

80. *Cichlasoma dovii* Günther, Regan, 338.
Habitat: Lake Nicaragua.

A81. *Cichlasoma spectabile* Steindachner, Regan, 339.
Habitat: Amazon.

82. *Cichlasoma krausi* Steindachner, Regan, 339.

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[1] Regan considers these species distinct.

*Chromis dentatus* Guichenot MS.
Habitat: Maracaibo and Cauca.

83. *Cichlasoma punctatum* Meek,[1]
Meek, 1909, 210.
Habitat: Costa Rica.

84. *Cichlasoma frontale* Meek,
Meek, 1909, 210.
Habitat: Costa Rica.

### CRENICARA Steindachner.

Type: *Crenicara elegans* Steindachner.
Range that of the single species.

A1. *Crenicara punctulata* (Günther),
Pellegrin, 133.
*Crenicara elegans* Steindachner.
Habitat: Essequibo and Amazons.

### DICROSSUS Agassiz.

Type: *Dicrossus maculatus* Steindachner.
Range that of the single species.

A1. *Dicrossus maculatus* Steindachner,
Pellegrin, 134.
Habitat: Amazons.

### BATRACHOPS Heckel.

*Boggiania* Perugia.
Type: *Batrachops reticulatus* Heckel.

1. *Batrachops ocellatus* Perugia,
Regan, 1905, 154.
Habitat: Upper Paraguay.

2. *Batrachops semifasciatus* Heckel,
Regan, 1905, 155.
Habitat: Paraguay to Montevideo.

A3. *Batrachops reticulatus* Heckel,
Regan, 1905, 155.
*Crenicichla elegans* Steindachner.
Habitat: Guianas to Amazon.

A4. *Batrachops punctulatus* Regan,
Regan, 1905, 156.
Habitat: Essequibo and Amazon.

A5. *Batrachops cyanotus* (Cope),
Regan, 1905, 156.
Habitat: Upper Amazon.

6. *Batrachops scottii* Eigenmann,
E., 1907*a*, 455.
Habitat: La Plata.

### CRENICICHLA Heckel.

Type: *Crenicichla vittata* Heckel.
Range: Guiana to La Plata.

A1. *Crenicichla lepidota* Heckel,
Regan, 1905, 158.
Habitat: Rio Guaporé; Paraguay to Buenos Aires; Rio Grande do Sul.

A2. *Crenicichla saxatilis* (Linnæus),
Regan, 1905, 159.
*Scarus rufescens* Gronow; *Cichla labrina* Agassiz; *Cychla rutilans* Schomburgk; *Scarus pavoninus* Gronow; *Crenicichla frenata* Gill; *C. proteus* Cope; *C. argynnis* Cope; *C. semicincta* Steindachner; *C. albopunctata* Pellegrin; *C. vaillanti* Pellegrin.
Habitat: Trinidad to Amazons; Paraguay Basin; Rio Grande do Sul.

A3. *Crenicichla lucius* Cope,
Regan, 1905, 160.
*Crenicichla anthurus* Cope.
Habitat: Amazon of Ecuador.

4. *Crenicichla geayi* Pellegrin,
Regan, 1905, 161.
Habitat: Orinoco.

5. *Crenicichla lacustris* Castelnau,
Regan, 1905, 162.
*Crenicichla punctata* Hensel; *C. polysticta* Hensel.
Habitat: Southern and eastern Brazil, Bahia to Rio Grande do Sul.

A6. *Crenicichla macrophthalmus* Heckel,
Regan, 1905, 162.
Habitat: Rio Negro.

A7. *Crenicichla wallacii* Regan, 1905, 162.
Habitat: Rio Essequibo; Rio Negro.

A8. *Crenicichla vittata* Heckel,
Regan, 1905, 163.

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[1] I am unable to give this and the next species their proper place.

Habitat: Amazon; Paraguay; Eastern Brazil.

A9. *Crenicichla acutirostris* Günther, Regan, 1905, 164.

Habitat: Rio Cupai.

10. *Crenicichla multispinosa* Pellegrin, Regan, 1905, 164.

Habitat: Surinam.

11. *Crenicichla marmorata* Pellegrin, Pellegrin, 1903, 347.

Habitat: ?

A12. *Crenicichla strigata* Pellegrin, Regan, 1905, 165.

*Crenicichla johanna,* var. *vittata* Günther, *non* Heckel.

Habitat: Amazon.

A13. *Crenicichla lugubris* Heckel, Regan, 1905, 165.

*Crenicichla funebris* Heckel.

Habitat: Brazil; Guiana; Venezuela.

14. *Crenicichla cincta* Regan, Regan, 1905, 166.

*Crenicichla fasciata* Pellegrin, *non* Schomburgk.

Habitat: Marajo Island, Para.

A15. *Crenicichla ornata* Regan. Regan, 1905, 167.

*Crenicichla lenticulata* Pellegrin, *non* Heckel.

Habitat: Amazon; Guiana.

A16. *Crenicichla lenticulata* Heckel.

*Crenicichla adspersa* Heckel.

Habitat: Rio Negro; Rio Guaporé.

A17. *Crenicichla johanna* Heckel.

*Cychla fasciata* Schomburgk; *Crenicichla obtusirostris* Günther.

Habitat: Brazil; Guiana; Venezuela.

### RETROCULUS Eigenmann & Bray.

Type: *Retroculus boulengeri* Eigenmann & Bray.

Range that of the single species.

A1. *Retroculus lapidifer* (Castelnau), Regan, 1906, 50.

*R. boulengeri* E. & B.

Habitat: Amazon.

### HETEROGRAMMA Regan.

*Mesops* Günther preoccupied.

Type: *Mesops tæniatus* Günther.

Range: Amazons, Rio Puty and Paraguay.

A1. *Heterogramma agassizii* (Steindachner), .............. Pellegrin, 151.

Habitat: Lower Solimoens, Amazon and Rio Puty.

A2. *Heterogramma tæniatum* (Günther), Pellegrin, 151.

? *Geophagus amœnus* Cope.

Habitat: Amazons; Paraguay.

3. *Heterogramma corumbæ* Eigenmann & Ward.

Habitat: Paraguay.

4. *Heterogramma trifasciatum* Eigenmann & Kennedy, ........ Pellegrin, 152.

Habitat: Paraguay.

5. *Heterogramma borellii* Regan, Regan, 1906, 63.

Habitat: Parahuaty.

6. *Heterogramma steindachneri* Regan, Regan, 1908*a*, 370.

Habitat: Georgetown.

7. *Heterogramma pleurotænia* Regan, Regan, 1909*a*, 270.

Habitat: La Plata.

### GEOPHAGUS Heckel.

*Biotodoma* Eigenmann & Kennedy.

Type: *Sparus surinamensis* Bloch.

Range: Panama to La Plata.

A1. *Geophagus surinamensis* (Bloch), Pellegrin, 162.

*Geophagus megasema* and *altifrons* Heckel; *Chromis proxima* Castelnau.

Habitat: Amazons and northward.

2. *Geophagus steindachneri* Eigenmann & Hildebrand.

*Geophagus brasiliensis* Steindachner, Fischfauna des Cauca, etc., not *brasiliensis* Quoy & Gaimard.

Habitat: Magdalena Basin.

3. *Geophagus brasiliensis* (Quoy & Gaimard), ............Pellegrin, 156.
*Chromis unipunctata* and *obscura* Castelnau; *Acara gymnopoma* Günther; *Geophagus rhabdotus, bucephalus, labiatus, scymnophilus* and *pygmæus* Hensel; *Chromis gibbiceps* Valenciennes.
Habitat: Coastwise streams from Bahia to Rio de la Plata.

4. *Geophagus balzanii* Perugia, ..Pellegrin.
*G. duodecimspinosus* Boulenger.
Habitat: Paraguay Basin.

5. *Geophagus australis* Eigenmann, E., 1907*a*, 454.
Habitat: La Plata.

6. *Geophagus brachyurus* Cope, Pellegrin, 159.
Habitat: Rio Grande do Sul.

7. *Geophagus cupido* Heckel, Pellegrin, 153.
Habitat: Amazons; Essequibo.

8. *Geophagus gymnogenys* Hensel, Pellegrin, 158.
*? Geophagus camurus* Cope.
Habitat: Rio Grande do Sul.

9. *Geophagus crassilabris* Steindachner, Pellegrin, 160.
*Geophagus jurupari* Vaillant, *non* Heckel.
Habitat: Colombia at Ibaqui; Panama, near Candelaria.

A10. *Geophagus camopiensis* Pellegrin, Pellegrin, 160.
Habitat: French Guiana.

A11. *Geophagus dæmon* Heckel, Pellegrin, 161.
Habitat: Middle course of Amazon.

A12. *Geophagus jurupari* Heckel, Pellegrin, 159.
*Geophagus leucostictus* Müller & Troschel; *Satanoperca macrolepis* Günther; *Geophagus pappaterra* Eigenmann & Kennedy, *non* Heckel.
Habitat: Guiana; Amazons; Paraguay.

### SATANOPERCA Günther.

Type: *Geophagus acuticeps* Heckel.
Range: Guiana to Paraguay.

1. *Satanoperca balzanii* (Perugia), Pellegrin, 155.
Habitat: Paraguay Basin.

A2. *Satanoperca acuticeps* (Heckel), Pellegrin, 155.
Habitat: Amazon and Solimoens.

A3. *Satanoperca pappaterra* (Heckel), Pellegrin, 156.
Habitat: Guaporé and Guiana.

### BIOTŒCUS Eigenmann & Kennedy.

Type: *Saraca opercularis* Steindachner.
Range that of the single species.
*Saraca* Steindachner preoccupied.

A1. *Biotœcus opercularis* (Steindachner), Pellegrin, 163.
Habitat: Villa Bella; Saraca.

### SYMPHYSODON Heckel.

Type: *Symphysodon discus* Heckel.
Range: Amazons.

A1. *Symphysodon discus* Heckel, Pellegrin, 214.
Habitat: Amazons and tributaries.

A2. *Symphysodon discus æquifasciatus* Pellegrin, ............Pellegrin, 214.
Habitat: Santarem; Teffé.

### PTEROPHYLLUM Heckel.

Type: *Platox scalaris* Cuvier & Valenciennes.
Range: Orinoco to Amazons.

A1. *Pterophyllum scalare* (Cuvier & Valenciennes), ..........Pellegrin, 215.
*Plataxoides dumerili* Castelnau.
Habitat: Amazons.

2. *Pterophyllum altum* Pellegrin, Pellegrin, 216.
Habitat: Orinoco.

## Family CARANGIDÆ.

### OLIGOPLITES Gill.

Type: *Chorinemus occidentalis* Günther =*Scomber saurus* Bloch & Schneider.

Range: Tropical seas of America; one species in fresh water.

1. *Oligoplites palometa* (Cuvier & Valenciennes), ............J. & E., 899.

Habitat: Lake Yzabal to Lake Maracaibo.

## Family GOBIIDÆ.

### PHILYPNUS Cuvier & Valenciennes.

Type: *Platycephalus dormitator* Bloch = *Gobiomorus dormitor* Lacépède.

Range: Both slopes of middle America.

1. *Philypnus dormitor* (Lacépède), J. & E., 2195.

*Platycephalus dormitator* Bloch; *Batrachus guavina* Bloch & Schneider; *Eleotris longiceps* Günther; *Eleotris dormitatrix* Cuvier.

Habitat: Eastern slope of Mexico, Central America (Lake Nicaragua) to Surinam; entering salt water.

2. **Philypnus maculatus** (Günther), J. & E., 2195.

*Philypnus lateralis* Gill.

Habitat: Pacific slope from Sonora to Panama and Ecuador; entering salt water.

### DORMITATOR Gill.

*Prochilus* Cuvier.

Type: *Dormitator gundlachi* Poey.

Range that of the single species.

A1. **Dormitator maculatus** (Bloch),[1] J. & E., 2196.

*Eleotris mugiloides, sima* and *? grandisquama* Cuvier & Valenciennes; *Eleotris latifrons* Richardson; *Eleotris somnolentus* Girard; *Eleotris omocyaneus* Poey; *Dormitator microphthalmus* Gill; *Dormitator gundlachi* Poey; *Dormitator lineatus* Gill.

Habitat: Atlantic slope from South Carolina to Para; Pacific slope from Cape San Lucas to Panama; entering fresh and salt water.

### GUAVINA Bleeker.

Type: *Eleotris guavina* Cuvier & Valenciennes.

Range: Cuba to Rio Grande do Sul.

A1. *Guavina guavina* (Cuvier & Valenciennes), ..........J. & E., 2198.

Habitat: Cuba to Rio Grande do Sul; entering rivers and salt water.

A2. *Guavina brasiliensis* (Sauvage). (Probably identical with *guavina.*)

Habitat: Bahia.

### ELEOTRIS Bloch & Schneider.

Type: *Gobius pisonis* Gmelin.

*Culius* Bleeker.

Range: Both slopes of middle America, West Indies, south to Rio de Janeiro.

1. *Eleotris amblyopsis* Cope, J. & E., 2199.

Habitat: Surinam.

2. *Eleotris pisonis* (Gmelin), J. & E., 2200.

*Gobius amorea* Walbaum; *Eleotris gyrinus* Cuvier & Valenciennes; *Eleotris belizianus* Sauvage.

Habitat: Florida to southern Brazil.

A3. *Eleotris perniger* (Cope), J. & E., 2201.

Habitat: Jamaica to Rio de Janeiro.

4. **Eleotris picta** Kner & Steindachner, J. & E., 2201.

*Culius æquidens* Jordan & Gilbert.

Habitat: Pacific slope, Sonora to Ecuador.

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[1] The Atlantic and Pacific slope forms have at times been considered distinct.

### SICYDIUM Cuvier & Valenciennes.

Type: *Gobius plumieri* Bloch.

Range: Fresh waters of the West Indies and Central America to Ecuador.

1. *Sicydium plumieri* (Bloch), J. & E., 2206.

*Sicydium siragus* Poey.

Habitat: Fresh waters of the West Indies.

2. **Sicydium pittieri** Regan, Regan, 1907*a*, 260.

Habitat: Panama to western Ecuador.

3. *Sicydium altum* Meek, Meek, 1907*a*, 149.

Habitat: Costa Rica to 600 meters.

### COTYLOPUS Guichenot.

*Sicya* Jordan & Evermann; *Oreogobius* Boulenger.

Type: *Cotylopus acutipinnis* Guichenot.

Range: Mazatlan to Panama.

1. **Cotylopus gymnogaster** (Ogilvie-Grant), ............J. & E., 2207.

Habitat: Streams about Mazatlan.

2. **Cotylopus salvini** (Ogilvie-Grant), J. & E., 2207.

*Oreogobius rosenbergii* Boulenger.

Habitat: Streams near Panama to Ecuador.

3. *Cotylopus punctatus* Regan, Regan, 1905, 362.

*Sicydium multipunctatum* Regan.

Habitat: Tequesixtlan.

### EVORTHODUS Gill.

Type: *Evorthodus breviceps* Gill.

Range that of the single species.

1. *Evorthodus breviceps* Gill, J. & E., 2208.

Habitat: Fresh waters of Trinidad and Surinam.

### LOPHOGOBIUS Gill.

Type: *Gobius cristagalli* Valenciennes = *cyprinoides* Pallas.

Range that of the single species.

1. *Lophogobius cyprinoides* (Pallas), J. & E., 2209.

*Gobius cristagalli* Valenciennes.

Habitat: Southern Florida; West Indies.

### GOBIUS Linnæus.[1]

*Gobionellus* Girard; *Ctenogobius* Gill.

Type: *Gobius niger* Linnæus.

Range: Marine; in all warm seas.

1. **Gobius soporator** Cuvier & Valenciennes, ............J. & E., 2216.

*Gobius lineatus* Jenyns; *G. catalus* Girard; *G. brunneus, mapo* and *laceratus* Poey; *G. andrei* Sauvage; *G. carolinensis* Gill; *Evorthodus catulus* Jordan & Gilbert.

Habitat: Both coasts, occasionally entering rivers.

2. *Gobius fasciatus* Gill, ....J. & E., 2222.

Habitat: Trinidad.

A3. *Gobius badius* Gill, ....J. & E., 2227.

*Gobius bosci* Sauvage.

Habitat: Mouth of Amazon.

### AWAOUS Steindachner.

*Chonophorus* Poey.

Type: *Awaous ocularis*, etc.

Range: Both slopes of middle America, south to the Rio Doce and Ecuador.

A1. *Awaous flavus* (Cuvier & Valenciennes), ...........J. & E., 2235.

Habitat: Mouths of rivers, Surinam to Rio Doce.

2. **Awaous nelsoni** Evermann, J. & E., 2235.

Habitat: Rosario, Sinaloa, Mexico.

A3. **Awaous taiasicus** (Lichtenstein), J. & E., 2236.

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[1] It is very probable that other species of the genus *Gobius* enter rivers; *parvus* Meek, is recorded from Boca del Rio, Vera Cruz; *claytoni* Meek from the same place, and *microdon* Gilbert from San Juan Lagoon, north of Rio Ahome, Mexico.

*Gobius banana* and *martinicus* Cuvier & Valenciennes; *Chonophorus bucculentus* Poey; *Rhinogobius contractus* Poey; *Gobius dolichocephalus* Cope; *Euctenogobius latus* O'Shaughnessy.

Habitat: West Indies; west slope, Lower California to Panama; east slope, Mexico to Rio Doce.

4. *Awaous mexicanus* (Günther), J. & E., 2237.

Habitat: Eastern slope of Mexico.

5. **Awaous transandeanus** Günther, Günther, III, 62.

*Gobius güntheri* Regan.

Habitat: Western Ecuador (to western Mexico?).

GOBIOIDES Lacépède.

Type: *Gobioides broussonnetti* Lacépède.

Range: Marine.

A1. *Gobioides broussonnetii* Lacépède, J. & E., 2263.

*Amblyopus brasiliensis* and *oblongus* Bloch & Schneider; *Gobioides barreto* Poey; *Amblyopus mexicanus* O'Shaughnessy.

Habitat: West Indies and mouths of Atlantic rivers from Florida to Rio de Janeiro.

2. **Gobioides peruanus** Steindachner, J. & E., 2264.

Habitat: Peru and Ecuador, ascending rivers.

## Family BATRACHOIDIDÆ.

THALASSOPHRYNE Günther.

Type: *Thallasophryne maculosa* Günther.

Range: South America, entering rivers.

A1. *Thalassophryne amazonica* Steindachner, ...... Steindachner, 1876, 113.

Habitat: Xingu; mouth of the Rio Negro.

A2. *Thalassophryne nattereri* Steindachner, Steindachner, 1876, 115.

Habitat: Para.

## Family BLENNIIDÆ.

CHASMODES Cuvier & Valenciennes.

Type: *Blennius bosquianus* Lacépède.

Range: Marine.

1. **Chasmodes maculipinna** Regan, Regan, 1903, 630.

Habitat: Rio Durango, northwest Ecuador.

## Order HETEROSOMATA.

## Family PLEURONECTIDÆ.

CITHARICHTHYS Bleeker.

Type: *Citharichthys cayennsis* Bleeker = *spilopterus* Günther.

Range: Marine and fresh water.

A1. *Citharichthys spilopterus* Günther, J. & E., 2685.

*Citharichthys guatemalensis* Bleeker; *Hemirhombus fuscus* Poey; *Citharichthys cayennsis* Bleeker.

Habitat: New Orleans to Rio Janeiro, entering rivers (Rio das Velhas).

2. **Citharichthys gilberti** Jenkins & Evermann, ............. J. & E., 2686.

*Citharichthys sumichrasti* Jordan & Goss; *Citharichthys spilopterus* Günther 1869, not of 1862.

Habitat: Guaymas to Panama, entering rivers.

## Family SOLEIDÆ.

### ACHIRUS Lacépède.

*Trinectes* Rafinesque; *Grammichthys, Monochirus* Kaup; *Baiostoma* Bean.
Type: *Achirus fasciatus* Lacépède.
Range: Marine and fresh water.

1. **Achirus klunzingeri** (Steindachner), J. & E., 2697.
Habitat: Panama to Guayaquil, entering rivers.

2. **Achirus mazatlanus** (Steindachner), J. & E., 2698.
Habitat: Pacific slope of Mexico, entering rivers.

A3. *Achirus lineatus* (Linnæus), J. & E., 2697.
*Monochir maculipinnis* Agassiz.
Habitat: Florida Keys and the West Indies to Uruguay; all streams from Cayenne to La Plata; ascending the Amazon to Tabatinga.

4. **Achirus fonsecensis** (Günther), J. & E., 2699.
Habitat: Pacific coast of tropical America, entering rivers.

5. **Achirus fischeri** (Steindachner), J. & E., 2699.
Habitat: Mamone River near Panama.

6. *Achirus garmani* Jordan, Jordan & Goss, 1899, 314.
Habitat: Rio Grande do Sul.

7. *Achirus fasciatus* Lacépède, J. & E., 2700.
Habitat: Atlantic coast, north of the Isthmus of Tehuantepec; ascending rivers.

8. *Achirus jenynsii* (Günther), Günther, IV, 476.
*Achirus lorentzi* Weyenbergh.
Habitat: La Plata to Paraguay.

### ACHIROPSIS Steindachner.

Type: *Achiropsis nattereri* Steindachner.
Range: Rio Negro to Goyaz.

A1. *Achiropsis nattereri* Steindachner, Steindachner, 1876, V, 110.
Habitat: Rio Negro.

A2. *Achiropsis asphyxiatus* Jordan, Jordan & Goss, 1889, 318.
Habitat: Goyaz.

### APIONICHTHYS Kaup.

*Soleotalpa* Günther.
Type: *Apionichthys dumerilii* Kaup.
Range: South America.

A1. *Apionichthys unicolor* (Günther), Günther, IV, 489.
*Apionichthys dumerilii* Kaup; *A. nebulosus* Peters.
Habitat: Surinam; Amazon, near Obidos.

### SYMPHURUS Rafinesque.

*Bibronia* Cocco; *Plagusia* Cuvier; *Aphoristia* Kaup; *Glossichthys* Gill; *Amonopleurops* Günther; *Acedia* Jordan.
Type: *Symphurus nigrescens* Rafinesque.
Range: Marine.

1. *Symphurus plagusia* Bloch & Schneider, Günther, IV, 490.
*Achirus ornatus* Lacépède; *Plagusia tessellata* Quoy & Gaimard; *Plagusia brasiliensis* Agassiz.
Habitat: La Plata.

## Order PLECTOGNATHI.

### Family TETRAODONTIDÆ.

COLOMESUS Gill.

*Batrachops* Hollard.

Type: *Tetrodon psittacus* Bloch & Schneider.

Range: Marine and fresh waters of tropical America.

A1. *Colomesus psittacus* (Bloch & Schneider), . . . . . . . . . . . . . J. & E., 1740.

*Cherlichthys asellus* Müller & Troschel.

Habitat: West Indies; Guiana to Marañon and Para.

LAGOCEPHALUS Swainson.

*Physogaster* and *Gastrophysus* Müller; *Promecocephalus* Bibron; *Tetrodon* Gill.

Type: *Tetrodon pennanti* Yarrell = *Tetrodon lagocephalus* Linnæus.

Habitat: Chiefly tropical seas.

1. *Lagocephalus lævigatus* (Linnæus).

*Tetrodon curvus* and *mathematicus* Mitchill; *Holocanthus melanothus* Gronow; *Tetrodon lineolatus* Poey.

Habitat: Cape Cod to Brazil, entering rivers; Para.

### SUMMARY.

| Families. | Number of Species in the Entire Area. | Number of Species in the Amazon Basin. |
|---|---|---|
| Petromyzonidæ . . . . . . | 5 | |
| Galeidæ . . . . . . . . . . . | 2 | |
| Rajidæ . . . . . . . . . . . . | 2 | |
| Narcobatidæ . . . . . . . . | 1 | |
| Myleobatidæ . . . . . . . . | 1 | |
| Dasyatidæ . . . . . . . . . . | 9 | 5 |
| Lepidosirenidæ . . . . . . | 1 | 1 |
| Lepisosteidæ . . . . . . . . | 2 | |
| Aspredinidæ . . . . . . . . . | 22 | 10 |
| Diplomystidæ . . . . . . . . | 1 | |
| Siluridæ . . . . . . . . . . . . | 300 | 139 |
| Hypophthalmidæ . . . . . | 2 | 1 |
| Pygidiidæ . . . . . . . . . . . | 66 | 28 |
| Callichthyidæ . . . . . . . . | 34 | 16 |
| Loricariidæ . . . . . . . . . | 208 | 81 |
| Cyclopidæ . . . . . . . . . . | 23 | 15 |
| Catostomidæ . . . . . . . . | 5 | |
| Cyprinidæ . . . . . . . . . . | 21 | |
| Characidæ . . . . . . . . . . | 659 | 317 |
| Gymnotidæ . . . . . . . . . . | 31 | 22 |
| Electrophoridæ . . . . . . | 1 | 1 |
| Synbranchidæ . . . . . . . | 1 | 1 |
| Anguillidæ . . . . . . . . . . | 1 | |
| Engraulidæ . . . . . . . . . | 13 | 7 |
| Clupeidæ . . . . . . . . . . . | 5 | 3 |
| Dorosomidæ . . . . . . . . . | 4 | |
| Elopidæ . . . . . . . . . . . . | 2 | |
| Osteoglossidæ . . . . . . . | 1 | 1 |
| Arapaimidæ . . . . . . . . . | 1 | 1 |
| Pæciliidæ . . . . . . . . . . | 160 | 14 |
| Galaxiidæ . . . . . . . . . . . | 7 | |
| Aplochitonidæ . . . . . . . | 2 | |
| Belonidæ . . . . . . . . . . . | 8 | 4 |
| Mugilidæ . . . . . . . . . . . | 11 | 1 |
| Atherinidæ . . . . . . . . . . | 33 | |
| Polycentridæ . . . . . . . . | 3 | |
| Centropomidæ . . . . . . . | 8 | 3 |
| Serranidæ . . . . . . . . . . . | 5 | |
| Hæmulidæ . . . . . . . . . . | 8 | |
| Sciænidæ . . . . . . . . . . . | 13 | 7 |
| Percidæ . . . . . . . . . . . . . | 1 | |
| Cichlidæ . . . . . . . . . . . . | 187 | 55 |
| Carangidæ . . . . . . . . . . | 1 | |
| Gobiidæ . . . . . . . . . . . . | 27 | 8 |
| Batrachoididæ . . . . . . . | 2 | 2 |
| Blenniidæ . . . . . . . . . . . | 1 | |
| Pleuronectidæ . . . . . . . . | 2 | |
| Soleidæ . . . . . . . . . . . . . | 12 | 4 |
| Tetraodontidæ . . . . . . . | 2 | 1 |
| Totals . . . . . . . . . . . . | 1917 | 748 |

# LIST OF PAPERS DEALING WITH THE FRESH WATER FISHES OF SOUTH AMERICA.

Arranged according to the year of publication and alphabetically under each year.

**Marcgravus, Georgius.**
1648 Historiæ Rerum Naturalium Braziliæ, iv.

**Piso, Gulielmus.**
1658 Indiæ Utriusque Re Naturali et Medica. Liber Tertius.

**Willoughby, Francis.**
1686 De Historia Piscium.

**Artedi, Petrus.**
1738 Ichthyologia sive Opera Omnia de Piscibus Scilicet: Bibliotheca Ichthyologica. Philosophia Ichthyologica. Genera Piscium. Synonymia Specierum. Descriptiones Specierum. Edidit Carolus Linnæus.

**Linnæus, Carolus.**
1749–69 Amœnitates Academicæ.
1754 Museum Adolphi Friderici, Stockholm, 1754.

**Gronovius, Laurentius Theodorus.**
1754–56 Museum Ichthyologicum.

**Linnæus, C.**
1758 Systema Naturæ, ed. x.

**Seba, Albert.**
1758 Locupletissimi Rerum Naturalium Thesauri Accurata Descriptio, vol. iii, 1758.

**Van der Lott, Fr.**
1762 Kort Bericht van den Congeraal, afte Drilvisch. In Verhandl. Holl. Maatsch. Haarlem.

**Gronovius, L. Th.**
1763, '64 '81 Zoophylacium Gronovianum.

**Linnæus, C.**
1766 Systema Naturæ, ed. xii.

**Pallas, Petrus Simon.**
1769 Spicilegia Zoologica, Petrop., 1769–'79.

**Bajon.**
1774 Mémoire sur un poisson à commotion électrique connu à Cayenne sous le nom d'Anguille tremblant.

**Garden, Alex.**
1775 An account of the *Gymnotus electricus*. In Philos. Trans., lxv.

**Hunter, John.**
1775 An account of the *Gymnotus electricus*. In Philos. Trans., lxv.

**Williamson, H.**
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1777 Mém. pour servir à l'histoire de Cayenne.

**Bloch, Marcus Elieser.**
1785–95 Naturgeschichte der ausländischen Fische. Berlin, 1785–95.

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1786 An account of an electric Eel or the torpedo of Surinam. In Transactions American Philosophical Society, II.

**Flagg, Henry Collins.**
1786 Observations on the numb fish or torporific Eel. In Transactions American Philosophical Society, II.

**Parra, Ant.**
1787 Descripcion de diferentes Piezas de Historia Natural, etc. Havana.

**Gmelin, Johann Friedrich.**
1788 Linnæi Systema Naturæ, ed. xii.

**Bonnaterre, M. l'Abbé.**
1788 Tableau Encyclopédique et méthodique des Trois Règnes de la Nature. Ichthyologie.

**Guisan.**
1797 Mémoire sur le *Gymnotus electricus*. In Bull. Sc. Soc. Philom., 1797.

1798–1804[1] Histoire Naturelle des Poissons; 5 vols., Paris.
**Lacépède, Bernard Germain.**

**Bloch, M. E.**
1801 Systema Ichthyologiæ, ed. Schneider, Johann Gottlob.

**Fahlberg, Sam.**
1801 Beskrifning öfver electriska Ålen, I *Gymnotus electricus*. In Vedensk Ak. nya Handl., 1801.

**Shaw, George.**
1803 General Zoology, vols. iv and v. London.

**Dumeril, Marie Constant.**
1806 Zoologie Analytique ou Méthode Naturelle de Classification des Animaux. Paris.

**Humboldt, Alexander von.**
1806 Versuche über die electrischen Fische.
1811, 1833 Recueil d'Observations Zoölogiques, vols. i and ii. Paris, 1811 and 1833.

**Cuvier, Georges.**
1817 Le Règne Animal distribué d'apres son Organisation. Paris.

**Meckel, J. F.**
1818 In Deutsch. Arch. Physiol., iv, 1818.

**Guisan.**
1819 Comment. de Gymnoto electrico. Tübingen.

**Lichtenstein, K. M. H.**
1820 Die Werke von Marcgrave und Piso über die Naturgeschichte Brasiliens. Abh. Berl. Akad. Wiss. 1820–21 and 1826.

**Knox, R.**
1824 Observations on the general anatomy of the *Gymnotus electricus*. In Edinb. Journal Science 1824.

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[1] See also Lacépède, in Mem. Instit. Nat. Sc. Math. Phys., ii.

**Quoy et Gaimard, G.**
1824 Voyage autour du Monde sur les corvettes de S. M. l'Uranie et la Physicienne, sous le commandement de Freycinet. Zoologie. Poissons, 1824.

**Cuvier, G., et Valenciennes, M.**
1828 Histoire Naturelles des Poissons, i, ii.

**Hancock, J.**
1828 Notes on some species of fishes and reptiles, from Demarara. In Zoölogical Journal, iv, also in Isis, 1830.

**Agassiz, Louis.**
1829 Selecta Genera et Species Piscium, quæ in itinere per Brasiliam collegit J. B. de Spix. 1829.

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1829 In Wiedemann *Zoöl. Mag.,* 1, part 3.

**Spix, J. B.**
1829 See Agassiz, 1829.

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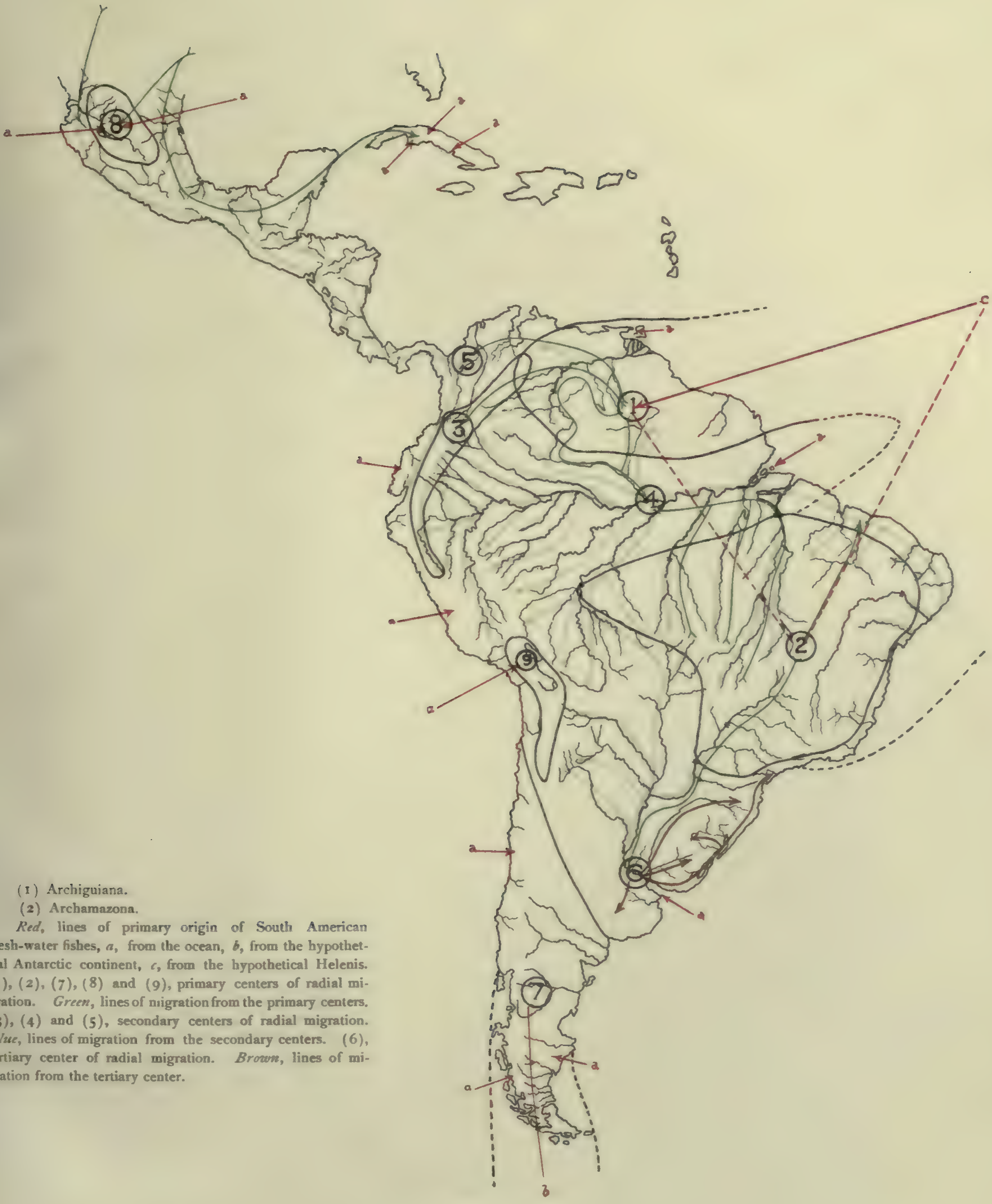

(1) Archiguiana.
(2) Archamazona.

*Red*, lines of primary origin of South American fresh-water fishes, *a*, from the ocean, *b*, from the hypothetical Antarctic continent, *c*, from the hypothetical Helenis. (1), (2), (7), (8) and (9), primary centers of radial migration. *Green*, lines of migration from the primary centers. (3), (4) and (5), secondary centers of radial migration. *Blue*, lines of migration from the secondary centers. (6), tertiary center of radial migration. *Brown*, lines of migration from the tertiary center.

MAP TO ILLUSTRATE THE MIGRATIONS OF SOUTH AMERICAN FRESH-WATER FISHES.

## PART V.

# NON-MARINE MOLLUSCA OF PATAGONIA.

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This report deals with the non-marine mollusks of Tierra del Fuego and Patagonia as far north as the thirty-ninth parallel, where the Rio Negro Valley forms a transition region, the Patagonian fauna giving place to the La Platan.

The scope of the work has been extended to include some account of all the South American forms of certain little-known families, such as the *Amnicolidæ* and *Sphæriidæ*, and all of the *Chilinidæ* occurring east of the Andes. Finally, the relationships of the South American molluscan fauna with the faunas of other continents are considered.

The collections made by Mr. J. B. Hatcher and placed in my hands by Professor William B. Scott form the basis of this report. The material from the region along the Rio Chico de la Santa Cruz and in the base of the Andes above its head is ample. Elsewhere but few mollusks were collected, and I have used material which I owe to the generosity of Dr. H. von Ihering, Director of the Museu Paulista, Dr. W. H. Rush, U.S.N., and others.

### ZONAL DISTRIBUTION OF PATAGONIAN MOLLUSCA.

An inspection of the data existing on Patagonian mollusks shows that several faunulas largely distinct in species occupy zones extending from the Atlantic to the Andes and succeeding one another from north to south. So far as aquatic animals are concerned, these zones are determined by the drainage systems, which are separated by poorly watered plains, and flow independently into the Atlantic. The aquatic mollusks known from these several zones are enumerated below.

*Chilina*, *Lymnæa* and *Pisidium* are the only genera of fresh-water mollusks which extend throughout Patagonia, the first two also in Tierra del

Fuego. The *Unionidæ* and *Mutelidæ*, groups copiously represented in the La Plata, have their southern limit in the Rio Negro, each represented by one species; *Planorbis* has two, *Ancylus* one species, the rest of the fauna being Patagonian. The Rio Negro fauna, including the region of Bahia Blanca, is transitional also in land mollusks, the genera *Bulimulus*, *Odontostomus* and *Strophocheilus* reaching their southern limit in the Sierra Ventana, near Bahia Blanca. In the humid region west of the Cordillera the faunal zones are deflected southward, the transition zone as marked by the southern limit of *Unionidæ* being in the neighborhood of Chiloe Island. That the transverse faunal zones of Patagonia run northward in the Andean region is shown by the occurrence on the upper Rio Chico of several Magellanic forms.

## I. LA PLATAN ZONE.[1]

Includes the Plata and its tributaries in Argentina, Uruguay, Paraguay, Brazil, and rivers flowing into the Atlantic in the Brazilian states of Sao Paulo and Rio Grande do Sul. Except in *Chilinidæ*, only the genera of this fauna are mentioned below, the species being very numerous.

Chilinidæ: *Chilina fluminea, C. f. microdon, C. globosa, C. rushii, C. parva, C. portillensis, C. tehuelcha mendozana.*
Physidæ: *Physa.*
Lymnæidæ: *Lymnæa, Planorbis.*
Ancylidæ: *Ancylus.*
Amnicolidæ: *Littoridina, Potamopyrgus, Potamolithus.*
Ampullariidæ: *Ampullaria, Asolene.*
Cyrenidæ: *Corbicula.*
Sphæriidæ: *Musculium, Pisidium.*
Unionidæ: *Diplodon, Castalia, Castalina.*
Mutelidæ: *Anodontites, Leila*, etc.

## II. PATAGONIAN ZONE.

### A. *Rio Negro Fauna.*[2]

(All of the known aquatic mollusks of this fauna and those following are enumerated.)

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[1] Probably the La Platan fauna is a subdivision of the Amazonian, chiefly characterized by the great development of *Chilinidæ* and *Amnicolidæ*.

[2] Including also the Rio Colorado, and known solely by the works of d'Orbigny and Doering.

Chilinidæ: *Chilina tehuelcha, C. puelcha, C. parchappii.*
Lymnæidæ: *Lymnæa viator, Planorbis peregrinus, P. anatinus.*
Ancylidæ: *Ancylus concentricus bonariensis.*
Amnicolidæ: *Littoridina parchappii, L. australis.*
Sphæriidæ: Not reported, but doubtless present.
Unionidæ: *Diplodon patagonicus.*
Mutelidæ: *Anodontites puelchana.*

### B. *Rio Chubut Fauna.*

Unknown.

### C. *Rio Santa Cruz Fauna.*[1]

Chilinidæ: *Chilina strebeli, C. smithi, C. fulgurata, C. f. oligoptyx, C. f. livida, C. f. andicola, C. f. hatcheri, C. campylaxis, C. monticola pilula, C. lebruni, C. perrieri.*
Lymnæidæ: *Lymnæa viator, L. diaphana, L. d. inelegans, L. patagonica riochicoensis, L. andeana.*
Amnicolidæ: *Littoridina hatcheri, L. simplex, L. sublineata.*
Sphæriidæ: *Musculium patagonicum, Pisidium magellanicum, P. patagonicum, P. observationis.*

### D. *Magellanic, Fuegian and Falkland Faunas.*[2]

Chilinidæ: *Chilina patagonica, C. amœna, C. fuegiensis, C. monticola, C. fusca, C. nervosa, C. falklandica.*
Lymnæidæ: *Lymnæa diaphana, L. patagonica, L. pictonica, L. brunneoflavida.*
Sphæriidæ: *Pisidium magellanicum.*

These several faunas may be roughly compared with the life-zones of North America. The La Platan zone is equivalent to the Austral, the Rio Negro fauna to the Transition, and the remainder of the Patagonian zone to the Boreal zone of the northern continent.

The distinctness of the Patagonian faunas A, C, D may be attributed to three main factors: (1) Climate, which imposes limits on the north or south distribution of species. (2) Absence of streams flowing north or south, and the consequent isolation of the river systems, favoring the evolution of distinct species. (3) Ignorance of the Patagonian faunas between the Rio Negro and the Rio Santa Cruz system, and along the base of the Andes, where Transition forms and intermingling of the species may occur.

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[1] Known only from the collections of Mr. J. B. Hatcher.

[2] From the researches of Captain King, Dr. Coppinger, the U. S. Exploring Expedition, the French Expedition to Cape Horn, Dr. Michaelson and others.

# GASTROPODA.

## Family *ENDODONTIDÆ.*

Two genera of this family are known from Patagonia: *Stephanoda* and *Radiodiscus.* The relationships of these forms to genera of other regions are unknown, since we have as yet no knowledge of their soft anatomy. *Endodontidæ* were present in the North American Carboniferous, represented by forms resembling the modern *Gonyodiscus* and *Charopa* in shell characters, and like their descendants, living in and upon decaying stumps. The family is now found all over the world, even on the most remote islands.

### RADIODISCUS Pilsbry.

*Radiodiscus* Pils., Proc. A. N. S. Phila., 1906, p. 154, for *R. millecostatus.*

Minute, discoidal, openly umbilicate Patuloid snails, with the embryonic 1½ whorls minutely engraved spirally, the rest of the shell densely radially costulate. Aperture rotund-lunate, but slightly oblique, and as high as wide. Type *R. millecostatus* Pils. & Ferr.

In the *Endodontidæ*, where small differences in the shell characterize extensive series of species, it seems desirable to recognize as of generic rank such readily definable groups as *Radiodiscus.*

The distribution of this genus is very wide, extending from Tierra del Fuego to the mountain ranges of the southern boundary of Arizona, where it meets the Holarctic *Gonyodiscus* and the Nearctic *Helicodiscus,* both at their southern limits. At present, the known distribution of *Radiodiscus* is markedly discontinuous, one area extending from southern Arizona to central Mexico, the other from southern Brazil to Cape Horn; yet it must be remembered that the Andes and northern South America are unsearched for minute shells. We know very few so small as these (2 to 3 mm. diam.); and some of the species imperfectly described may turn out to belong to *Radiodiscus.* It is likely that the group is an Austral one, which has invaded Mexico from the south.

Some Tasmanian snails have a great resemblance to *Radiodiscus,* in size, form and sculpture — a resemblance possibly due to convergence, but perhaps indicating affinity. I have not been able to actually compare specimens. On account of their spirally sculptured embryonic shells Hedley has referred them to the subgenus *Allodiscus* of the genus *Flammulina*.[1]

### RADIODISCUS COPPINGERI (E. A. Smith).

*Helix* (*Patula*) *coppingeri* Smith, P. Z. S., 1881, p. 36, pl. 4, f. 14, 14*a*.
*Patula coppingeri* Smith, Strebel, Zool. Jahrb., XXV, 1907, p. 159.

The shell is described as 1 × 1⅔ mm., composed of 3½ whorls, the "umbilicus moderately small, equalling about one-sixth of the basal diameter."

It was described from Tom Bay (Dr. Coppinger), found on a rotten tree. This is near Madre de Dios Island, on the west coast. Strebel reports specimens which he identified as *coppingeri* from the west coast of Tierra del Fuego, Ushuaia, and Navarin Island. While this form must stand near *R. patagonicus*, it appears distinct by the much smaller umbilicus, if we may trust the published figures. I have not seen specimens. The apical sculpture has not been described.

### RADIODISCUS MAGELLANICUS (E. A. Smith).

*Helix* (*Patula*) *magellanica* E. A. Smith, P. Z. S., 1881, p. 36, pl. 4, figs. 15, 15*a*.

This species, described from the same place as the preceding, will probably prove to be a *Radiodiscus*, when the embryonic whorls are examined.

### RADIODISCUS PATAGONICUS (Suter).

(Plate XLII, Figs. 1, 1*a*, 1*b*.)

*Pyramidula patagonica* Suter, Revista do Museu Paulista, IV, 1900, p. 334, pl. 3, f. 6, 6*b*.
*Stephanoda patagonica* Suter, Pilsbry, Proc. A. N. S. Phila., 1900, p. 387, pl. 12, f. 9–11.

The shell is openly umbilicate (the umbilicus about one-fourth the total diameter), of a uniform pale brown tint, discoidal, the spire convex but low, suture deeply impressed. Whorls about 3½, convex, slowly increasing, the embryonic 1½ densely striate spirally, the rest radially costellate, the riblets about as wide as their intervals, about 25 in 1 mm. on the last half of the last whorl. Under the microscope some very minute striations may be seen upon the ribs, and in places an extremely minute and very faint spiral striation. The rotund-lunate aperture is slightly oblique.

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[1] *Cf. Flammulina* (*Allodiscus*) *roblini* Petterd, as figured by Hedley in Records of the Australian Museum, VII, 1909, p. 300.

Alt. 0.9, diam. 1.7 mm. (50 miles above Sierra Oveja).
" 1.2 " 1.8 mm. (Santa Cruz).

Santa Cruz (v. Ihering, type locality). Near Mt. of Observation. On the Rio Chico 50 miles above Sierra Oveja, on a dry stone near the water. Spring near base of the Andes, 65 miles north of the Rio Chico, elevation 2400 ft. Banks of a small stream 10 miles from Ushe Lake (J. B. Hatcher).

The above description and the figures are from a shell collected alive 50 miles above the Sierra Oveja. The original description, in Portuguese, was based upon fossil specimens, which had lost the color and part of the finer sculpture. The original lot of *patagonicus* was from Santa Cruz, on the coast, in a modern deposit. Part of the original lot is before me. They are a little larger than the living shell described, with the whorls slightly deeper; yet in the series examined from all of the localities yet known, the very slight differences seem to intergrade.

## STEPHANODA Albers.

This group comprises Patuloid species in which the embryonic whorl is typically smooth, but in some forms now referred here it is marked with radial striæ, but no spirals. It differs from *Amphidoxa* (with which I formerly united it) by the more numerous, less rapidly widening whorls. Without a knowledge of the soft parts, the relationships of these South American snails to the Austral *Charopa* and *Flammulina*, and to the northern Patuliform genera, cannot be defined. The following species from southern Patagonia belong here:

*S. lyrata* (Gld.), summit of highest mountain near Orange Harbor, etc. (*Helix lyrata* Gld.).
*S. leptotera* (Mab. et Rochebr.), Orange Bay (*Patula leptotera* M. & R.).
*S. rigophila* (Mab. et Rochebr.), Orange Bay (*Patula r.*, M. & R.).
*S. michaelseni* (Strebel), Magellan Strait to Navarin Island (*Patula m.*, Strebel, 1907).

## Family *ZONITIDÆ.*

The small land snails originally described as *Helix saxatilis* Gld. and *H. ordinaria* Smith have all the external characters of the *Hyalinia* group of *Zonitidæ*. *H. saxatilis* has pedal grooves and a mucous pore at the tail. Mabille and Rochebrune have proposed for it the generic term *Payenia*. What status this group will ultimately be given depends wholly upon the internal anatomy, of which we know nothing. It may possibly belong to the *Endodontidæ*.

PAYENIA SAXATILIS (Gld.), U. S. Expl. Exped., Mollusca, p. 42, pl. 3, f. 33. Orange Harbor, under dry stones.

PAYENIA ORDINARIA (E. A. Smith), P. Z. S., 1881, p. 36, pl. 4, f. 16, 16*a*. Tom Bay, on the west coast, attached to the frond of a fern.

## Family *LIMACIDÆ.*

Except as introduced animals, *Limacidæ* are unknown in South America. A species of *Limax* (probably the European *Agriolimax lævis* or *A. agrestis*) has been reported from the Falkland Islands and from Ushuaia, Tierra del Fuego (Strebel, Wissenschaftliche Ergebnisse der schwedischen Süd Polar-Expedition, die Gastropoden, p. 7, 1908).

*Agriolimax lævis* under the name *Agriolimax argentinus* Strobel has attained a rather wide distribution in temperate South America. Doering reports it from the Rio Colorado, Rio Negro, and Sierra de Córdoba.

## Family *SUCCINEIDÆ.*

### SUCCINEA Drap.

### SUCCINEA PATAGONICA E. A. Smith.

*S. patagonica* Smith, P. Z. S., 1881, p. 37, pl. 4, f. 17, 17*a*; Proc. Malac. Soc. London, VI, 1905, p. 338.

*S. lebruni* Mabille et Rochebrune, Miss. Sci. Cap Horn, Moll., p. 14, pl. 6, f. 4*a*, 4*b*.

The shell is rather ventricose, greenish-yellow, with the first whorl light scarlet. Length 12.5 mm. Cockle Cove, shores of Trinidad Channel and Puerto Bueno (Dr. Coppinger); Rio McClelland (Capt. Crawshay).

*S. lebruni* seems to differ only in the smaller size of the type specimens, length 8–9 mm. — a trivial distinction. It was taken at Punta Arenas and Orange Bay.

Two specimens, the largest 10 mm. long, were taken by Mr. Hatcher at Punta Arenas.

### SUCCINEA MAGELLANICA Gould.

*S. magellanica* Gld., U. S. Expl. Exped., Moll., p. 24, pl. 2, f. 22; Strebel, Zool. Jahrb., XXV, 1907, p. 161, Taf. 8, f. 99; ? Doering, Informe Oficial Exped. Rio Negro, 1881, p. 62.

The shell is ventricose, similar to the preceding, except that the apex is not red. Type locality Orange Bay, but reported from numerous localities between Punta Arenas and Navarin Island by Strebel (*l. c.*). It has been recorded also from the region of Sierra Ventana, above Bahia Blanca, by Dr. Adolfo Doering, but there is a possibility that some similar form has been mistaken for *S. magellanica*.

### SUCCINEA ORDINARIA E. A. Smith.

*S. ordinaria* Smith, Proc. Malac. Soc. London, VI, 1905, p. 338, fig. iv.

A species with 3 to 3½ very convex whorls, length 10.25 mm., diam. 6, length of aperture 6 mm. It is "apparently very like *S. lebruni* Mabille, but without the sanguineous apex and rather more coarsely sculptured." I have not seen this species, which is probably closely related to *S. màgellanica*. Admiralty Sound, Tierra del Fuego (Captain Crawshay).

### SUCCINEA MERIDIONALIS d'Orbigny.

*Succinea meridionalis* d'Orbigny, Voyage dans l'Amér. Mérid., pp. 711; Doering, Informe Oficial Exped. Rio Negro, 1881, p. 62 (var. *cornea*).

Sierra de la Ventana (d'Orbigny). Swamps in the pampa north of the Rio Negro (Doering, for var. *cornea* Doer.).

### SUCCINEA BURMEISTERI Doering.

(Plate XLII, Figs. 2–6.)

*Succinea burmeisteri* Doering, Malakozoologische Blätter für 1873, XXI, p. 59, Taf. 2, f. 15–19 (Rosario am Paraná).

"Gehäuse eiförmig, zugespitzt, etwas bauchig, durchscheinend, gelblich-hornfärbig, stark und oft unregelmässig runzelig gestreift, wenig glänzend. 3½ ziemlich stark convexe und rasch an Weite zunehmende Umgänge; der letzte etwas bauchig. Gewinde zugespitzt. Mündung gerundet-eiförmig, der äussere Rand des ziemlich breiten, obwohl etwas undeutlichen Spindel-Umschlages mit dem Mundsaum zusammenhängend.

"Longit. 12 mm. Lat. 7.3 mm. Apertura 8 mm. longa, 5⅓ mm. lata."

Dr. Doering's description and figures apply fairly well to a *Succinea* of the *S. avara* group, which is abundant and widely distributed in the territory of Santa Cruz, collected at the following stations:

Near Mt. of Observation (near the coast, south of Santa Cruz River).

Near Pescadores, south side Santa Cruz River, 15 miles above mouth.

Spring on Rio Chico, above mouth of Rio Chalia.

Spring on Rio Chico, north side, near Sierra Ventana.

Spring on Rio Chico, 7 miles above Sierra Ventana.

Spring near Sierra Oveja.

Springs on Rio Chico, 15, 40 and 50 miles above Sierra Oveja, and 25 and 15 miles below confluence of Rio Belgrano.

Stream near mouth of the Rio Belgrano.

Base of Andes, 40 miles north of Rio Chico, 2000 feet elevation.

Base of Andes, 50 miles north of Rio Chico, 1750 feet elevation.

Base of Andes, 65 miles north of Rio Chico, 2400 feet elevation.

Pool near Arroyo Eke, near head of Spring Creek, elevation 1750 feet.

Specimens from a spring 7 miles above the Sierra Ventana, "on horse dung near the water," are figured, Pl. XLII, figs. 4, 5. 6. The color varies from honey-yellow to whitish-yellow, always with the first whorl of a deeper yellow shade. The suture is very deep and the whorls extremely convex. The specimens figured measure:

Length 11, diam. 6 mm., length of aperture 6.5 mm.; whorls 3½.
" 11 " 6.9 " " " 7.25 " " 3½.
" 12.3 " 6.9 " " " 7 " " 3¾.

It will be noted that, as compared with Doering's description, these shells have the aperture shorter.

At all other stations the shells are smaller. Two figured from the Rio Chico 50 miles above Sierra Oveja (Pl. XLII, figs. 2, 3) representative of this small form measure:

Length 7.9, diam. 4.9 mm., length of aperture 5 mm.; whorls 3⅓.
" 7.5 " 4 " " " 4 " " 3½.

In a series of fossil individuals from the banks of a stream 10 miles from Ushe Lake (collected January 14, 1898), there is remarkable variation in contour, though most of the shells are much lengthened.

Length 11, diam. 6.1, length of aperture 6.3 mm.; whorls 3½.
" 9.8 " 5.5 " " 5 " " 3¾.
" 8.8 " 6 " " 5.3 " " 3⅓.

## Family *LYMNÆIDÆ.*

### LYMNÆA Lamarck.

*Lymnæa* is more widely distributed than any other genus of freshwater mollusks, extending from the shores of the Arctic Ocean to Tasmania and Cape Horn, and in the Pacific reaching the Hawaiian group. The genus in its present limits is a synthetic group, which no doubt will ultimately be divided into several genera.

There are very few species in tropical South America, where the genus seems to be of rare occurrence; but in Patagonia the species are more numerous, individuals are abundant and generally distributed. South American Lymnæas fall into three subgenera or sections of the genus. Section I is clearly an intrusive element from North America. Section II may possibly be of North American origin, but its relationships are unknown, as no specimens with the soft parts have been received. Section III is peculiar to Patagonia, and not closely related to any northern forms.

I. Section GALBA Schrank. The marginal teeth of the radula differ from the laterals by being more oblique, but are essentially *tricuspid.* The shell is small, compactly coiled, of very convex whorls, usually umbilicate, the columellar lip broadly revolute, not folded. The type is *L. truncatula* of Europe. South America species, *L. viator*, *L. cousini.*

II. Section ——— ? Dentition unknown. The shell is lengthened, fragile, *Succinea*-shaped, of few whorls, the last large and elliptical. *L. peregrina*, *L. andeana.*

III. Section PECTINIDENS n. sect. The marginal teeth are broad and short, the cusps split into a comb-like series of many narrow denticles. Type *Lymnæa diaphana* King. There are two groups of species.

Group of *L. diaphana.* Moderately large, elongated forms, with very convex whorls and a narrow umbilical chink.

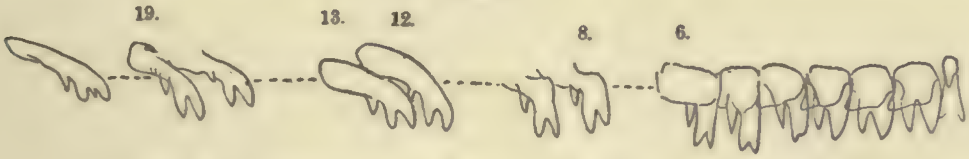
Group of *L. patagonica.* Small forms, with very short spire (peculiarly liable to truncation) and few whorls, the last relatively very large and short, rimate or imperforate. *L. patagonica*, *L. p. riochicoensis*, *L. pic-*

*tonica.* It is possible that the presence of acid in the water, causing erosion of the shell, may also account for the stunted stature of these forms.

## Dentition of South American Lymnæas.

*Dentition of L. viator* d'Orb.—The radula examined was from one of the specimens taken on the Rio Chico near the Sierra Oveja. The central tooth is narrow and unicuspid as usual. There are three or four lateral teeth, having two long cusps. In the following transition teeth the inner cusp (entocone + mesocone) is long and bifid, ectocone simple. The marginal teeth are very oblique, with three cusps, entocone, mesocone and ectocone. In some of the outer marginal teeth there may be one or two minute accessory cusps.

Fig. 1.

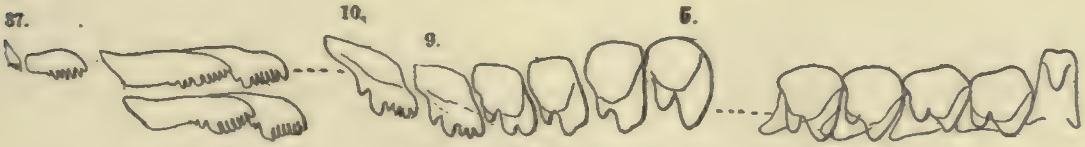


Teeth of *Lymnæa viator* d'Orb. Rio Chico, Patagonia.

The radula of *L. viator* agrees well with that of the European *L. truncatula* as figured by Lehmann. It differs from typical *Lymnæa* by retaining the primitive tricuspid type of teeth in the marginal series, with few small accessory cusps or none. Lymnæas with this type of teeth have a continuous distribution from Patagonia to Alaska and in the Palæarctic region.

*Dentition of Lymnæa diaphana* King.—These are about 30, 7, 1, 7, 30 teeth. The central tooth is wider than usual in *Lymnæa*, unicuspid. The lateral teeth are bicuspid, the broad inner cusp becoming bifid on the transition teeth. The inner marginals have the mesocone and entocone split into four to six small cusps, the ectocone remaining simple. Further out the marginals become transversely lengthened, their cusps lie

Fig. 2.

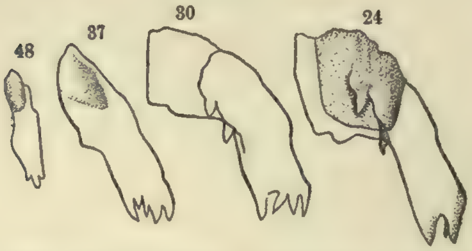


Teeth of *Lymnæa diaphana* King. Rio Chico, Patagonia.

parallel to the long axis of the tooth, and are split into a comb-like series of denticles.

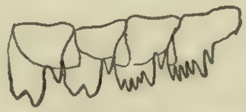
The marginal teeth of *L. diaphana* differ from those of typical *Lymnæa* by their prostrate position, the cusp of one tooth overlying the basal plate of the succeeding one in the same transverse row, and also by the comb-like cusps. In typical *Lymnæa* (*L. stagnalis*, fig. 3) the cusp stands obliquely erect, its cutting edge transverse to the long axis of the tooth.

FIG. 3.



Marginal teeth of *Lymnæa stagnalis* L. (after Dybowski).

FIG. 4.



Two outer lateral and two inner marginal teeth of *Lymnæa patagonica riochicoensis* Pils.

*Lymnæa patagonica riochicoensis* (fig. 4, two outer lateral and two inner marginal teeth) has a radula closely resembling that of *L. diaphana*. There are ten lateral teeth.

No *Lymnæa* of the northern hemisphere, of which the teeth are known, has marginals like those of *L. diaphana*, but I have shown that somewhat similar teeth exist in a Hawaiian species.[1]

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[1] Figures of Lymnæid teeth may be found in the following works, among others:

Lehmann: Die lebenden Schnecken und Muscheln der Umgegend Stettins und in Pommern, 1873, Taf. 15, 16.

J. Hazay: Malak. Blätter, n. F., VII, Taf. 1 (*Lymnæa auricularia, ovata, peregra*).

W. Dybowski: Studien über die Zahnplatten der Gattung Limnæa Lam., in Bull. Soc. Imp. Naturalistes de Moscou, LX, 1884, pt. 2, pp. 256–262, pl. 5 (*L. stagnalis* var. *vulgaris*). The best figures of *Lymnæa* teeth published. Also, Malak. Blätter, n. F., VIII, p. 124, Taf. 7 (*Amphipeplea glutinosa*).

R. P. Whitfield: Description of *Lymnæa* (*Bulimnæa*) *megasoma* Say, in Bull. Amer. Mus. Nat. Hist., I, 1882, p. 29, pl. 5.

Fischer et Crosse: Mission Scientifique au Mexique, Mollusques, II, pl. 36 (*L. auricularia*).

F. C. Baker: A revision of the Limnæas of northern Illinois, in Trans. St. Louis Acad. Sci., XI, 1901, pp. 1–24.

H. A. Pilsbry: Proc. A. N. S. Phila., 1903, p. 790 (*L. hawaiiensis*).

### Section GALBA Schrank.

### LYMNÆA VIATOR d'Orbigny.

(Plate XLVI, Fig. 8).

*Limnæus viator* d'Orb., Magazin de Zoologie, 1835, p. 24; Voy. dans l'Amér. Mérid., Moll., p. 340, pl. 43, figs. 1–3.

A species of the group of *L. truncatula.* The shell is small and smoothish, composed of five very convex whorls, joined by a very deep suture; the aperture is oval or nearly round, more than half the length of the shell. The axis is very distinctly umbilicate. Length 8, diam. 4 mm.

d'Orbigny records this species from the banks of the Rio Negro, 41° S. lat., 7 or 8 leagues above the mouth, very abundant. This may be considered the type locality. Afterwards he collected it also at Santiago, Chili, and at Callao and Lima, Peru, in irrigation ditches. The specimens from Peru, he notes, are constantly more elongate than those of Patagonia and Chili, with the whorls more deeply separated. Dr. W. H. Rush collected many specimens in a creek in the Prado, at Montevideo, Uruguay. These specimens, with others from Lima before me, do not seem separable from the Antillean *L. cubensis* Pfr. (1840) by any character in the shells.

Specimens from a pool on the bank of the Rio Chico, a mile west of the Sierra Oveja (Pl. XLVI, fig. 8) are larger than those from Uruguay, the individual figured measuring length 10, diam. 5.1, length of aperture 5 mm., whorls 5½. The spire is longer, and the umbilicus somewhat narrower. The columellar margin is broadly revolute and without fold or perceptible sinuosity. This form differs from that figured by d'Orbigny, and from the Montevideo shells examined, chiefly by having a longer spire and shorter aperture, the latter half as long as the shell; by having more whorls, a smaller umbilicus, and by its somewhat greater size.

### Section PECTINIDENS n. sect.

### LYMNÆA DIAPHANA King.

(Plate XLVI, Figs. 3, 7, 9).

*Lymnæa diaphana* King, Zoological Journal, V, p. 344, No. 43, 1830.

*Limnæa diaphana* King, Sowerby, Conchologia Iconica, XVIII, pl. 5, fig. 30, 1872.

*Limnæa diaphana* King, Strebel, Zool. Jahrb., XXV, p. 163, Taf. 8, figs. 100*a–c*, 1907.

*Limnæa lebruni* Mabille, Bull. Soc. Philomathique de Paris (7), VIII, p. 44, 1883. Mabille et Rochebrune, Mission Scientifique du Cap Horn, Mollusques, p. 19, 1889.

Freshwater ponds in the neighborhood of Cape Gregory (Cabo San Gregorio) on the north side of the Straits of Magellan, just west of the 40th meridian (King). Punta Arenas and Gente Grande, Lagune (Strebel). Punta Arenas (Mabille, for *L. lebruni*).

King's type measured about 17 × 7.5 mm.; Strebel's shells were smaller, 10–13 mm. long, and he seems to have entertained some doubt of their identity with King's. *L. lebruni* is described as 16 to 20 mm. long, and agrees well with *L. diaphana* in other respects. It may be noted that Mabille and Rochebrune do not mention *L. diaphana*, and evidently overlooked it.

On the Rio Chico de la Santa Cruz Mr. Hatcher collected numerous Lymnæas of the *L. diaphana* type, some agreeing with the typical form from the Straits of Magellan, others divergent therefrom.

In what I take to be typical *L. diaphana*, from a spring on the Rio Chico, 15 miles above the Sierra Oveja (Pl. XLVI, figs. 3, 7, 9) the shell is thin, but moderately strong, narrowly rimate, rather long, the last whorl swollen, but *much smaller than in L. d. inelegans*, very evenly rounded, with sculpture of unequal growth-lines, but not malleated, and very glossy. The spire is *long, slender and acuminate*. The shortly ovate aperture is rather small; columella very narrowly revolute, not adnate above, continuing free to the parietal wall above the axial crevice. The color is light brown, or, when the cuticle is worn off, pink, or pinkish white. Specimens measure:

Fig. 3. Length 17, diam. 9.4, length of aperture 8.8 mm.; whorls 5½.
" 9. " 14 " 7.25, " " 6.9 " " 5⅓.
" 7. " 6.3 mm.; whorls 4 (young shell).
" 21.2, diam. 11, length of aperture 10.8 mm.; whorls 6.
" 17 " 9.8 " " 9.4 " " 5⅓.
" 17.8 " 10.4 " " 10 " " 5⅓.

In a small stream, 5 miles above Sierra Oveja, the shells are nearly typical in shape, but small and thin. One measures, length 11.8, diam.

6.7, aperture 6.7 mm.; whorls 5. One from near the Sierra Ventana is similar.

In a pool near the Sierra Oveja the shells are similar, but darker colored, more olive. The apices are eroded.

### LYMNÆA DIAPHANA INELEGANS subsp. nov.

(Plate XLVI, Figs. 1, 2, 4–6).

The shell is narrowly rimate, short and wide, the *last whorl disproportionately large*, inflated, with sculpture of rather coarse growth-wrinkles and more or less malleation. The spire is small, shortly conic. *Aperture very ample.* Columella very indistinctly or not folded, narrow, nearly straight in the middle, its edge narrowly reflexed, expanding in the axial region. The specimens figured measure:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Length | 16, | diam. | 10.5, | length of aperture | 10.8 | mm.; whorls | 5. |
| " | 16 | " | 9.3 | " " | 9.7 | " " | 4¾. |
| " | 16 | " | 10 | " " | 9.4 | " " | 5. |
| " | 15 | " | 10 | " " | 9.7 | " " | 4¾. |
| " | 15.3 | " | 9 | " " | 9 | " " | 5. |

Spring on the Rio Chico, 25 miles above the Sierra Oveja (figs. 1, 2, 4, 6). Small stream, 35 miles above Sierra Oveja (fig. 5).

The specimens from the second locality mentioned are more regular in contour. Up to a length of 15½ to 16 mm. the surface shows no malleation, and at that size the shells of this lot reach maturity. The lip expands slightly and a very thin, white, submarginal callus strengthens it. In one individual growth has proceeded beyond this stage, the part added being strongly malleated. This shell (Pl. XLVI, fig. 5) measures, length 17, diam. 10, length of aperture 9.8 mm.; whorls 5.

In two of the four lots from "springs on the Rio Chico, 25 miles above Sierra Oveja," there are some dwarf individuals. One measures, length 10, diam. 6, aperture 6.5 mm.; whorls 4¼. In another lot, all the shells are similarly dwarfed.

In the Rio Chico, 50 miles above Sierra Oveja, a similar dwarf shell was taken.

In and near drying pools on a high divide near the base of the Andes, 50 miles north of the Rio Chico, elevation 2400 ft., the shells are very fragile, pale, dull buff, with strongly developed, low, wave-like costation and more or less malleation. One measures, length 14, diam. 8, length of aperture 8.6 mm.; whorls 4½. Those from the Arroyo Eke, near the head of Spring Creek, are also small.

In Swan Lake (about 50 miles north of the Rio Chico) the shells are very delicate, almost like tissue paper, but little malleated or (usually) without malleation, and of a pale olive color. Most of the examples conform nearly to Pl. XLVI*a*, fig. 2, in shape, but I have also figured the most elongate (fig. 1) and the shortest (fig. 3) shells. Fig. 2 measures, length 19, diam. 11, length of aperture 10.9 mm.; whorls 4¾.

Mr. Hatcher in his narrative has alluded to the abundance of shells in this lake (Reports of the Princeton University Expeditions to Patagonia, I, p. 166). The lake basin is composed of igneous rocks dammed by a lava flow. To the absence of calcareous material, the tenuity of the shells is probably due.

*Lymnæa brunneoflavida* Preston, Annals and Magazine of Natural History (8), V, January, 1910, p. 110, pl. 4, fig. 1, from the Falkland Islands, is described as wider, more opaque and darker than *L. diaphana*, alt. 14, diam. 8, aperture 8.75 mm. It evidently stands close to *L. diaphana*.

### LYMNÆA PATAGONICA Strebel.

*Limnæa patagonica* Strebel, Zool. Jahrb., XXV, p. 164, Taf. 8, figs. 103*a*, *b*, 1907.

Strebel's types are said to differ from the form he describes as *L. diaphana* by being browner, more of a chestnut-brown, the whorls increase more rapidly in width, the apex is commonly broken, with the breach closed by shell-material; the columella stands more nearly vertical, and its reflection is somewhat wider, but leaves an umbilical crevice open. It measures as follows:

Length 14.8, diam. 12.6, aperture 10.7 × 6.8 mm., 3½ whorls remaining.
" 10.4, " 8.1, " 7.2 × 4.5 " 3 " "
Puerto Bridges, in a fresh-water lake.

### LYMNÆA PATAGONICA RIOCHICOENSIS subsp. nov.

(Plate XLVI, Figs. 10, 11.)

The shell resembles *L. patagonica* in shape, being short ovate; the axis is *imperforate*. It is *pale honey-yellow* or *very pale yellowish-brown*. In an entire specimen (fig. 11) there are 3¼ convex and rapidly enlarging whorls, the last inconspicuously marked with rather widely spaced, very low longitudinal wrinkles, and some weak malleation in places. The aperture appears to be less rounded than in *L. patagonica.* The parietal and axial callus is a mere transparent film (not distinct as shown in fig. 11), closely adnate throughout. The columella is white, solid and rounded, nearly straight, and without trace of a fold. The largest specimen (fig. 11) measures:

Length 6.8, diam. 4.8, aperture 4.9 × 3.1 mm.

Rio Chico, 25 miles below the confluence of the Rio Belgrano, in the river under stones, numerous specimens. Also in a pool near the Sierra Oveja, one characteristic individual.

Most of the adult examples taken are very much eroded, the spire removed, and the last whorl deeply eaten in places, as though by acid. The parietal callus is thick, with the outer edge distinctly raised. The external erosion is compensated by thickening of the shell from the inside. Fig. 10 measures:

Length 5, diam. 4, aperture 4.1 × 3 mm.; 2⅓ whorls.

Although the perfect and the deeply eroded shells were in one lot when received, yet I have no doubt that they came from two sources, one of pure water, the other carrying $CO_2$, doubtless from leaching through decaying organic matter.

### LYMNÆA PICTONICA Rochebrune et Mabille.

*Limnæa pictonica* R. et M., Miss. Sci. Cap Horn, p. 21, 1889.

A small, very fragile species, with exserted spire and truncate apex, 2 or 3 convex, rapidly increasing whorls remaining. There is a very narrow perforation.

Length 6, diam. 3 mm.

Picton Island, in the southeastern termination of the Beagle Channel.

This species seems to be decidedly narrower than the preceding. It may be the southern terminal member of the series of short Lymnæas represented in the Magellan district by *L. patagonica* and on the Rio Chico, 400 to 500 miles farther north, by *L. p. riochicoensis.* It is quite possible, however, that these several forms may prove to be independent shortened forms, each directly related to more normal forms.

### SECTION UNDETERMINED.

### LYMNÆA ANDEANA sp. nov.

(Plate XLVI*a*, Figs. 4, 4*a*.)

The shell is acuminate-oblong, imperforate, very thin and fragile, pale yellowish-corneous, translucent. Surface dull, smooth to the eye except on the last part of the last whorl, where it is conspicuously malleated. Under the microscope the dullness is seen to be caused by extremely fine hair-lines, mainly longitudinal in direction, but forming a close mesh over the whole surface. There are also faint growth-lines and weak traces of spiral bands of vertical wrinkles. Whorls barely 4, the first convex, those following only weakly so. The last whorl has the form of a long ellipse. Aperture ovate. Parietal film scarcely perceptible. Columella slender, slightly concave, dilated above, the dilatation thin and adnate.

Length 11.9, diam. 6.3 mm.; aperture 7.3 mm. long.

Near the base of the Andes in drying pools on a high divide, 50 miles north of the Rio Chico.

This species is apparently related to *L. peregrina* Clessin of southern Brazil and Uruguay, but differs conspicuously by the very weak development of spiral sculpture, that species being even more copiously striate spirally than the North American *L. columella*.

A few immature specimens of another thin, fragile species, probably related to *L. andeana*, were taken in small streams on the Rio Chico, 10 and 25 miles above the Sierra Oveja.

### PLANORBIS PEREGRINUS d'Orbigny.

*Planorbis peregrinus* d'Orb., Voy. dans l'Amér. Mérid., p. 348.

Rio Negro, Bahia Blanca, etc. (d'Orbigny); lakes along the Rio Negro (Roca Exped.).

### PLANORBIS ANATINUS d'Orbigny.

*Planorbis anatinus* d'Orb., t. c., p. 351 (Paraná river, Prov. Entrerios, Argentina).

Lakes along the Rio Negro (Roca Exped.).

## Family *ANCYLIDÆ.*

### ANCYLUS CONCENTRICUS BONARIENSIS Strobel.

*A. c.* var. *bonariensis* Strobel, Materiali, etc., p. 51, pl. 2, f. 4 (around Buenos Aires).

*A. c. bonæriensis* Strobel, Doering, Informe Oficial de la Comision cientifica agregada al estado mayor general de la Expedition al Rio Negro, bajo las órdenes del General D. Julio A. Roca, Zoologia, p. 71, 1881.

Rio Negro near the mouth of the Rio Neuquen (Roca Exped.).

## Family *CHILINIDÆ* Dall.

*Chilinidæ* Dall, Annals of the Lyceum of Natural History of New York, IX, 1870, p. 357.

### CHILINA Gray.

*Chilina* Gray, Specilegia Zoologica, p. 5, July 1, 1828 (for *Auricula fluctuosa* Gray).

*Dombeia* d'Orbigny, Voyage dans l'Amérique Méridionale, Mollusques, planche 43 (1843?).

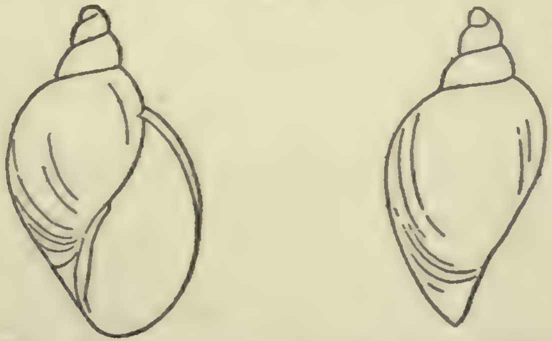
*Duplicaria* Rafinesque, Atlantic Journal and Friend of Knowledge, No. V, 1833, p. 165 (for *D. bonariensis* Raf. = *Chilina fluminea* Maton).

*Pseudochilina* Dall, Annals of the Lyceum of Nat. Hist., New York, IX, 1870, p. 357 (for *Pseudochilina limnæformis* Dall).

*Acyrogonia* Mabille et Rochebrune, Mission Scientifique du Cap Horn, VI, 1889, Mollusques, p. 25.

The apex in *Chilina* differs from that of all Lymnæid snails in the initial half whorl of the embryo, which is tilted up, as shown in fig. 5. Growth of the shell seems to be upward at first, the nucleus lying below the summit. At the end of the third whorl, in *C. fulgurata* and several other species, the color-pattern begins weakly. Previous to this the shell is uniform corneous-brown. The columellar fold is present at a very early stage, but my material does not show when it first appears.

FIG. 5.



*Chilina fulgurata* Pils. Young specimen 3.8 mm. long, composed of 3 ½ whorls.

The growth of the shell in Patagonian species is periodic, growth-arrest periods being marked by streaks interrupting the normal pattern. On resumption of growth, the zigzag pattern is sometimes replaced by irregular streaks; but in a later growth-period the original pattern may be resumed.

The subgenus *Pseudochilina* was based upon a form shaped about like fig. 7 of Plate XLIII. The irregular or fibrous surface, which served to characterize the subgenus, seems to me to be wholly due to erosion, the cuticle or periostracum being lost from the unique type in the National Museum. In other characters the shell is a typical *Chilina.*

*Acyrogonia* of Mabille and Rochebrune is a *Chilina* in which the columellar plait is wanting. I have found this plait variable in development in some forms of *Chilina* from the Rio Chico. In *C. fulgurata oligoptyx* it approaches the condition described in *Acyrogonia.*

## DISTRIBUTION OF CHILINA.

*Chilina* occupies the temperate and cold zones of South America from the Tropic of Capricorn to Cape Horn. No member of the group, either living or fossil, has been found outside of these limits.[1] It is noteworthy that no trace of the group has been found in other Austral lands — Tasmania and New Zealand having sufficiently similar climatic conditions to favor the survival of *Chilinidæ*, if the family ever had a wider range in the Antarctic area.

Within their area, the *Chilinidæ* are abundant snails in all suitable stations, as *Physidæ* are in the north. They swarm in springs, small streams, lakes, and in some places the margins of rivers. They are most abundant southward, becoming rarer and local toward the northern borders of their range.

The species from west of the Andes are in all cases, so far as we know, distinct from those east of the divide. In the cold temperate and cold zones at least, the widely diverse physical features on opposite sides of the Andes would lead us to expect different snail faunas.

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[1] *Chilina olivula* Repelin, Ann. Mus. d'Hist. Nat. de Marseille, VII, p. 69, of the Cenomanian of central France, has no columellar fold, and is clearly a Lymnæid snail with no relations whatever to *Chilina*. *Chilina* in Europe, like *Partula, Polygyra, Glandina,* etc., is one of those myths of European palæontology which astonish and amuse the investigator using modern methods with Pulmonate snails.

The eastern fauna, with which alone we have now to deal,[1] inhabits a comparatively arid region, poorly watered by roughly parallel streams flowing southeastward into the Atlantic. Each of the principal river systems has its own series of freshwater mollusks, in large part distinct specifically or racially from those of other rivers. The *Chilinidæ* of the several drainages have been enumerated on pp. 514–5.

### CHILINA PATAGONICA Sowerby.

*Chilina patagonica* Sowb., Conchologia Iconica, XIX, pl. 3, fig. 11 (bad), August 1874; E. A. Smith, Proc. Zool. Soc., London, 1881, p. 845; Strebel, Zool. Jahrb., XXV, 1907, p. 166.

Patagonia (Sowerby). Puerto Bridges, Picton Island and Puerto Montt (Strebel, various forms taken by Michaelson and Lau).

Mr. Smith has given valuable information on this species in his paper of 1881. Strebel includes in it some very diverse forms, the pertinence of which to *patagonica* seems open to doubt.

The specimens figured by Strebel from Gente Grande Bay, under the name "*Chilina fluviatilis* Gray," are obviously not *Chilina fluviatilis* (Maton) of the La Plata drainage. What they are, remains uncertain.

### CHILINA AMŒNA E. A. Smith.

*Chilina amœna* E. A. Smith, P. Z. S., 1881, pp. 37, 846, pl. 4, f. 18, 18*a*.

"This species is remarkable for its fragility, the slenderness of its form and the vividness of the markings."

Length 26, diam. 11, aperture 14.5 mm.

Tom Bay (Coppinger).

### CHILINA FUEGIENSIS E. A. Smith.

*Chilina fuegiensis* E. A. Smith, Proc. Malac. Soc. London, VI, p. 339, fig. vii, September, 1905.

A very slender species, length 24, diam. 10, aperture 13.5 mm., apparently related to the preceding.

Rio Marazzi, Useless Bay, Tierra del Fuego.

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[1] Mr. E. A. Smith has published a catalogue of *Chilina* in Proceedings of the Zoological Society of London, 1881, to which the student is referred for information on the species of Chili.

### CHILINA FUSCA Mabille.

*Chilina fusca* Jules Mabille, Bull. Soc. Philomathique de Paris (7), VIII, 1883, p. 45.

*Acyrogonia fusca* Mabille et Rochebrune, Miss. Sci. du Cap Horn, VI, 1889, p. 25.

The shell is fragile, brownish-corneous, ornamented with a few brown spots; columella white, somewhat twisted, a little thickened, but without a fold. Length 16 to 17, diameter 8 mm.

Punta Arenas (Lebrun).

This species is the type of the group *Acyrogonia*[1] described as a new genus of *Chilinidæ*, with the following characters: "Shell thin but quite strong, the general shape acutely oval, spire projecting but not very slender; columella arcuate, twisted but little, without the columellar folds characteristic of *Chilina*, and descending to the base of the aperture."

This group is known only by the original account. Neither of the two species has been figured. I do not think it generically distinct from *Chilina*. In some species of that genus the columellar fold is reduced to an inconspicuous vestige.

### CHILINA NERVOSA (Mabille et Rochebrune).

*Acyrogonia nervosa* Jules Mabille et Rochebrune, Mission Scientifique du Cap Horn, VI, Mollusques, Pt. H., p. 26 (1889).

A more compact, ventricose species than *C. fusca*, with the aperture wider, the columella thick, arcuate, impressed in the middle and without a fold. Length 16, diam. 10 mm.

Punta Arenas, in pools (Lebrun).

### CHILINA FALKLANDICA Preston.

*Chilina falklandica* Preston, Annals and Magazine of Natural History (8), V, January, 1910, p. 111, pl. 4, fig. 2.

Near *C. amœna*. Length 15, diam. 8, aperture 9.5 mm.

Falkland Islands.

### CHILINA STREBELI sp. nov.

(Plate XLIV, Figs. 24–28.)

The shell is elliptical, with a short, conic and acute spire; rather solid. Sculpture of rather coarse and unequal wrinkles along growth-lines and minute, indistinct spiral striæ. The ground-color is rather bright yellow on the last whorl, copiously marked with purplish-brown zigzag streaks, each with 4 principal angles projecting forward, and more or less widened at the angles. On the latter part of the whorl the streaks disappear, leaving four bands of spots. The spire is dark blue, with dusky brown zigzag markings on the penultimate and next earlier whorls, those above being uniform purplish-brown or dull blue. Whorls between 5½ and 6, convex, regularly increasing, the last elliptical, widest in the middle. The aperture is nearly vertical, white, rich brown deep in the throat, showing the external markings as purplish-brown spot-bands. Columella rather broad, white, bearing a rather stout oblique fold above, a slight spirally entering prominence below it (in most examples scarcely showing in front view). Parietal callus thin, bearing a low, spirally entering fold at its lower third, usually hardly visible in a front view.

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[1] *Acyrogonia* Jules Mabille et Rochebrune, Mission Scientifique du Cap Horn, VI, Mollusques, p. 25, 1889.

| | | | | | | |
|---|---|---|---|---|---|---|
| Fig. 24. | Length | 25, | diam. | 14.2, | length of aperture | 18 mm. |
| “ 25. | “ | 25.2 | “ | 14.5 | “ “ | 18 “ |
| “ 26. | “ | 23.5 | “ | 13.2 | “ “ | 16 “ |
| | “ | 24 | “ | 13 | “ “ | 16 “ |

Mount of Observation, 40 miles south of Santa Cruz River.

This fine species was collected in some quantity. It is distinguished from *Chilina puelcha* d'Orb. by the presence of a parietal fold, among other peculiarities. No other species from south of the Rio de La Plata drainage has this fold developed. In the young stages (figs. 27, 28) the color-streaks are less distinctly defined, fading at their edges,[1] and the parietal fold is present only as a very thin whitish callus.

## CHILINA SMITHI sp. nov.

(Plate XLIII, Figs. 1–4.)

The shell is oblong-ovate, solid, minutely rimate, rather rudely sculptured, with wrinkles of growth and more or less distinct spiral lines; always more or less deeply eroded in the adult stage. The color of the cuticle is olive, or in the newly-formed band behind the outer lip it is yellow. In adults a large part of the cuticle is wanting, exposing the calcareous layer beneath, which is blue and gray, or when deeply worn (as in figures 3 and 4), it is white. The spire is worn, whorls convex, the last one *distinctly shouldered*, compressed laterally, widest at the middle *or below it*. The aperture is nearly vertical, very dark chestnut-colored within in adults, less dark in younger shells, fleshy-whitish near the lip-edge, which is thin and acute. The columella is not very wide, flat, white or flesh-tinted, more or less concave, and bears a rather small, very oblique fold above. Parietal callus very thin, transparent.

---

[1] They are represented entirely too sharply defined in figures 27 and 28.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Fig. | 1. | Length | 41, | diam. | 22, | length of aperture | 24 | mm. |
| " | 2. | " | 30 | " | 15.3 | " " | 19 | " |
| " | 3. | " | 39.5 | " | 20 | " " | 22 | " |
| " | 4. | " | 31.2 | " | 19 | " " | 21.8 | " |
| | | " | 35.2 | " | 17.2 | " " | 21.6 | " |

Springs on the Rio Chico, 15–25 miles above the Sierra Oveja.

This is one of the largest species of the genus, remarkable for its solid, inornate shell, shouldered at the last whorl (a feature not very well shown in the figures), and very dark chestnut or purplish-chestnut interior. Typically the spire is well produced, as in figs. 1, 3, but the lot contains also shortened forms, such as fig. 4.

The shouldered last whorl, solidity and color distinguish this species from *C. parchappii* d'Orb. It also attains a larger size. Named in honor of Mr. E. A. Smith, to whom we owe a very useful catalogue of the genus.

Young shells up to 22 mm. long show faint traces of waved longitudinal brown streaks on the last whorl, but in older ones these disappear, though faintly indicated spot-bands may persist up to 30 mm. long in some examples. Figures 8, 9, 10 of Plate XLIII represent young shells 17.2, 16 and 14.5 mm. long respectively. At this stage there are 5½ to 6 whorls. The spire is acuminate and the apex perfect in some individuals. On a yellow ground there are chestnut streaks, which show three (figs. 8, 9) or four (fig. 10) forwardly projecting angles, with a row of spots just below the suture.[1]

### CHILINA LEBRUNI Mabille.

*Chilina lebruni* Jules Mabille, Bulletin Soc. Philomathique de Paris, 7 Série, VIII, 1883, p. 45; Mabille et Rochebrune, Mission Scientifique du Cap Horn, VI, Zoologie, Pt. H., Mollusques, p. 22, 1889.

An unfigured form, probably related to *C. fulgurata*. Length 10 to 13 mm., diam. 6 to 9 mm.

Santa Cruz (Lebrun).

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[1] The pattern is not very well rendered in the drawings, and the outlines of the markings are too definite.

### CHILINA FULGURATA sp. nov.

(Plates XLIII, Figs. 11–15; XLIII*a*, Fig. 4.)

The shell is imperforate, elliptical, with short, conic spire, thin. Fully grown shells are in large part dull gray from loss of the cuticle on the back, but what remains in front is dull pale yellowish, with numerous dusky brown, angular streaks (fig. 15). Younger shells (fig. 11, length 12 mm., and fig. 12, length 13.2 mm.) are densely marked with reddish-chestnut, zigzag stripes on a whitish or in places yellow ground, the penultimate whorl with a blue ground. In an older stage (figs. 13, 14, length 16 mm.) the ground color on the back and spire is blue, but whitish at the base. The brown stripes have four forwardly projecting angles. The apices are more or less eroded in the type lot, but there are evidently not less than 5 whorls. The aperture shows the external marking on a ground more or less suffused with rich light chestnut in shells not fully adult, but in old shells the markings are not seen, and the throat becomes chestnut, fading to whitish near the lip. The columella is rather narrow, white, straight, or only slightly arcuate, and bears a small and rather thin, very oblique lamella above.[1]

| | | | |
|---|---|---|---|
| Fig. 15. | Length 19, | diam. 10.7, | length of aperture 12.9 mm. |
| " 13–14. | " 16, | " 8.9, | " " 10.9 " |

Small stream on the Rio Chico, 5 miles above the Sierra Oveja, type locality; also northward to the foothills of the Andes, in various springs and streams.

This species has the elaborate color-pattern of *Chilina puelcha* d'Orbigny, but differs from that by its comparatively narrow contour. The dimensions of the type of *C. puelcha* are, length 20, diam. 15 mm. *C. fulgurata* is probably related more closely to *C. parchappii* d'Orb., a more slender and lengthened species, deficient in color-ornamentation.

The type of *C. fulgurata* is drawn in Plate XLIII, figs. 13, 14, and Plate XLIII*a*, fig. 4.

In springs twenty-five miles above the Sierra Oveja, a large, thin form of *fulgurata* was found. The elaborate color-pattern persists through the period of maturity, but fails in the aged or gerontic stage. The surface has minute axial plicæ and distinct spiral lines, giving it a decussate-granular appearance, more or less developed in different examples. The columella is flat, vertical, nearly straight, with a small, compressed and acute fold above. Pl. XLIII*a*, figs. 6, 6*a*, represent an old shell deeply eroded in places. Length 18 (spire largely eroded), diam. 11, length of aperture 13 mm. In this lot the cuticle persists over most of the surface.

---

[1] This lamella, while correct as to outline in figures 13 and 15, is represented as more massive than it really is.

At 30 miles above the Sierra Oveja similar large shells were found in a spring. In even the largest, the color-pattern and sculpture persist to the lip-edge. Pl. XLIII*a*, fig. 7, represents an area immediately below the termination of the suture. The shell measures, length 20.7, diam. 11, length of aperture 13.4 mm. The apex is eroded.

In a small running stream on the south side of the Rio Chico, 25 miles above Sierra Oveja, two forms of *Chilina* were found: numerous small *C. fulgurata*, the largest 10 to 11 mm. long, and probably not fully adult; and three examples of a very elongate form, one of them figured in Pl. XLIV, fig. 23. In this shell the waved streaks appear only on the last half of the last whorl, being preceded by two bands of small spots.[1] The columella is Lymnæid. Sculpture as in the large decussate *C. fulgurata*. Axis rimate. Length 17, diam. 8, length of aperture 10 mm. The significance of these examples is doubtful.

Small specimens which seem to be *C. fulgurata* were taken in a spring on the south side of the Rio Chico, seven miles above the Sierra Ventana.

### CHILINA FULGURATA OLIGOPTYX subsp. nov.

(Plate XLIV, Figs. 18, 18*a*, 20–22*a*.)

The shell is oval, inflated, with short but acuminate spire of between 5 and 6 whorls. The cuticle is extremely thin and deciduous, but more or less usually remains on the face and behind the outer lip. It is corneous, or slightly yellowish (somewhat too yellow in figs. 20, 21, 22), with faint reddish-brown streaks. Where the epidermis is removed, the shell is ash colored, or livid purplish or fleshy, sometimes showing traces of the waved color-markings, the spire often dark purple (as in fig. 22*a*). The columella is only moderately arched, and either has no fold (fig. 18) or a small fold may be seen above, in an oblique view, sometimes somewhat stronger than in fig. 22. The outer lip is somewhat thickened within, in adult shells.

---

[1] The scattered dots shown in fig. 23 are ferrous deposits, foreign to the shell.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Fig. | 18. | Length | 15, | diam. | 8, | length of | aperture | 10 | mm. |
| " | 21, 22. | " | 12 | " | 7 | " | " | 8.8 | " |
| " | 22*a*. | " | 12.5 | " | 7 | " | " | 9 | " |
| | | " | 12 | " | 7.1 | " | " | 8.6 | " |
| | | " | 13.5 | " | 7.3 | " | " | 9 | " |
| | | " | 12.2 | " | 7.9 | " | " | 9.5 | " |

Spring on the north side of the Rio Chico near the Sierra Ventana. Types No. 88,686 A. N. S. P. Also taken in springs 20 and 25 miles below the Sierra Ventana.

By its shorter form, weak or wanting columellar fold, and the less developed color-pattern, this race differs from *C. fulgurata*. Some examples from 25 miles below the Sierra Ventana are more fully colored, resembling *C. fulgurata* in this respect; and it may be said that dead shells which retain the cuticle also show the color-pattern more distinctly than living shells.

### CHILINA FULGURATA LIVIDA subsp. nov.

(Plates XLIII, Figs. 5–7; XLIV, Figs. 16, 17, 19.)

The spire is *longer* than in *fulgurata*, acuminate, and consisting of fully 6½ whorls; spiral striæ distinct. In the adult stage the surface, where unworn, is *livid purplish* on the back, and color-streaks are wanting or very weak, though one to three faint spot-bands are generally retained. The eroded spots have the appearance of mould, the edges under a hand-lens, appearing fuzzy or fibrous. The columellar fold is usually well developed, though often appearing weak or blunt in a face view. The interior is dark purplish-brown.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Fig. | 5. | Length | 20.5, | diam. | 10.25, | length of | aperture | 12.1 | mm. |
| " | 6. | " | 20 | " | 10 | " | " | 12 | " |
| " | 7. | " | 16 | " | 8 | " | " | 9.8[1] | " |
| | | " | 23.8 | " | 12.9 | " | " | 15.4 | " |

Spring 15 miles above the Sierra Oveja. Types no. 88,662 A. N. S. P. The young stage down to 14 mm. long, is colored like fig. 7, but occasional specimens of larger size show some faint, waved color-streaks.

Another lot which I refer to *livida* (Pl. XLIV, figs. 16, 17, 19) was taken in a small stream 5 miles above the Sierra Oveja. The half grown stage (Pl. XLIV, fig. 19) is elaborately zigzag-striped with reddish-brown on a buff ground. In older shells (figs. 16, 17) the pattern is very indistinct or lost by erosion.

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[1] Immature.

Fig. 16. Length 21.8, diam. 10, length of aperture 12 mm.
“ 17. “ 18 “ 9 “ “ 10.9 “
“ 19. “ 13.1 “ 6.9 “ “ 8 “

### CHILINA FULGURATA ANDICOLA subsp. nov.

(Plate XLIII*a*, Figs. 5, 5*a*.)

A series of three quite young shells from under stones along a small running stream near the mouth of the Rio Belgrano, and a single shell, perhaps adult, from a spring 50 miles north of the Rio Chico, at an elevation of 1750 ft., indicate that a special race inhabits the Andean foothills, though the material at hand is hardly sufficient for its full characterization. The cuticle is rather bright yellow, with a full development of the *fulgurata* pattern in young shells. This pattern begins about the middle of the third whorl.

In the larger shell (Pl. XLIII*a*, figs. 5, 5*a*), from the second locality, the ground is olive or greenish-yellow. The first half of the last whorl has the usual *fulgurata* streaks, but the last half (following a growth-arrest period) has the streaks broken, leaving four spot-bands. The yellow ground also has many fine olive lines. The aperture is like that of *fulgurata*. The apex is eroded. Length 8.5, diam. 5, length of aperture 6.8 mm.

### CHILINA FULGURATA HATCHERI subsp. nov.

(Plate XLIII*a*, Figs. 3, 3*a*.)

The shell is *thin*, of a dilute dull red color, variegated with four bands of spots, more or less indistinct, often hardly noticeable. There are also some obscure red-brown longitudinal streaks. The spire is darker, acuminate above, its surface more or less eroded. There would be over 5 whorls if the apex were perfect. Surface glossy, with fine growth-lines and very delicate spiral striæ, much as in *C. fulgurata* from 30 miles above Sierra Oveja, but much more delicate. Columella straight and flattened below, acutely folded above, similar to large forms of *C. fulgurata*.

Fig. 3. Length 19, diam. 10, length of aperture 13.4 mm.
“ 3*a*. “ 17.5 “ 8.8 “ “ 11.5 “

Arroyo Eke, near the headwaters of Spring Creek (north of the Rio Belgrano), April 10, 1898.

Except on the spire, the cuticle is generally well preserved. When worn on the last whorl, it is deciduous along the spiral striæ, which otherwise are hardly noticeable. These shells are readily distinguishable from any taken at lower levels, along the Rio Chico.

### CHILINA CAMPYLAXIS sp. nov.

(Plate XLIII*a*, Figs. 1–2*a*.)

The shell is oval, much inflated, thin. Dead individuals, but evidently almost or wholly unchanged in color, are light reddish-brown, with rather faint streaks of chestnut, which are angular and dilated to form three bands of sagittiform spots besides a row of small spots below the suture. These markings are often less fully developed than in the figured specimens, and they are generally removed in part by the erosion of the surface. Where the cuticle is retained behind the outer lip, it is yellow. The surface shows spiral striæ more distinct than usual. The aperture is light brown or fulvous inside. The outer lip does not seem to be thickened within, as it is in *C. f. oligoptyx*. The *columella is narrow, deeply concave*, and has a small but distinct fold above (rarely subobsolete.)

| | | | | |
|---|---|---|---|---|
| Figs. 1, 1*a*. | Length 19, | diam. 11.2, | length of aperture 13 | mm. |
| " 2, 2*a*. | " 18.2 | " 11 | " " 12 | " |
| | " 18 | " 11 | " " 12.25 | " |
| | " 17 | " 10.8 | " " 12.8 | " |
| | " 17 | " 11 | " " 13 | " |
| | " 17.2 | " 11 | " " 13 | " |
| | " 17 | " 10.2 | " " 12 | " |

The numerous specimens vary but slightly in size or other features. They have some resemblance to the Magellanic *C. patagonica*, which however is figured as having a straight columella and a stronger columellar fold.

All of the specimens are "dead" shells. At this spring *C. fulgurata oligoptyx* was also found, both alive and among the dead shells which were preserved separately; the larger individuals have the outer lip noticeably thickened. The shells of *C. campylaxis* differ constantly from the associated *oligoptyx* in various structural features, and must, I think, be regarded as specifically diverse.

### CHILINA PERRIERI Mabille.

*Chilina perrieri* Jules Mabille, Bull. Soc. Philomathique de Paris (7), VIII, 1883, p. 46; Mabille et Rochebrune, Miss. Sci. du Cap Horn, VI, Pt. H., Mollusques, p. 24, 1889.

A short, oval, solid form, apparently near *C. monticola.* Length 12, diam. 8 mm. It has not been figured.

Santa Cruz (Lebrun).

### CHILINA MONTICOLA Strebel.

*Chilina monticola* Strebel, Zool. Jahrb., XXV, 1907, p. 169, Taf. 8, fig. 101.

The shell is thin but rather strong, translucent chestnut, with separated, dilute, waved streaks, or spot bands also, mostly indistinct; comparatively broad, with short, acute spire of about 5 whorls. Columella has a very weak fold, not visible in front view.

| | | | | | |
|---|---|---|---|---|---|
| Length | 9.8, | diam. | 6.9, | aperture | 8.4 × 3.9 mm. |
| " | 8.5 | " | 6.8 | " | 7.5 × 3.2 " |

Punta Arenas, in a large mountain lake at an elevation of about 300 meters.

Strebel seems to entertain some doubt as to whether this may not be an immature stage of *C. ovalis* Sowerby. I have not seen specimens.

### CHILINA MONTICOLA PILULA subsp. nov.

(Plate XLIV, Figs. 29, 30, 30*a*.)

The shell is very small, shortly oval, with a very short conic spire; thin; glossy when unworn, sculptured with fine growth-striæ and indistinct, minute spiral lines. Adult shells are generally dull ashy- or brownish-white from loss of the cuticle, but where preserved, it is yellow or dusky reddish, closely marked with indistinct reddish-brown streaks, upon which there are spots at intervals, forming five spiral bands, one just below the suture, the others at subequal intervals on the last whorl. The longitudinal streaks are scarcely visible on some examples, and the spot-bands are often very faint or reduced to three. The very short spire is eroded in all the specimens seen, the number of whorls being therefore uncertain. The aperture is quite ample and shows the external color through the thin outer lip. The columella is white, rather narrow and weakly arcuate, having a very small and low fold close to the upper end, and hardly noticeable in most specimens.

Length 5.1, diam. 3.8, length of aperture 4.3 mm.

Springs on the Rio Chico, 25 miles below the Sierra Ventana, Feb. 15, 1899.

This species is known from 40 specimens in two lots, taken the same day in the same neighborhood, but apparently from two springs, the station numbers being different and the condition of the specimens as regards erosion slightly diverse. There is also another individual from a different station, "freshwater spring on the Rio Chico," date and locality not given. They range in size from young shells less than 3 mm. long to slightly over 5 mm. In a shell of 3 mm. there are fully three whorls. All the adults have the spire worn, so that the number of whorls is uncertain, but there are evidently four or more.

The very globose shape of these shells shows that they are not young or dwarf individuals of the larger species of the same region. Moreover, the larger ones have the eroded and old appearance of adult snails. Whether the species attains greater size in the streams running from the springs which they inhabit remains uncertain. I know of several instances of dwarf snails inhabiting springs, having put at least one such case on record.[1] It is evident that the usual explanations of dwarfing in small quantities of water are not pertinent, since in flowing springs there is no lack of aëration and no accumulation of the toxines of metabolism. It seems likely that the dwarfing of snails in springs may be due to the purity of the water, which affords an insufficient supply of diatoms, other algæ and vegetable food.

This form is, for the time being, ranked as a subspecies of *Chilina monticola* from Punta Arenas, but I suspect that it is related rather to *C. fulgurata*. Apparently adult shells are only about half the size of *monticola*.

### CHILINA TEHUELCHA d'Orbigny.

*Chilina tehuelcha* d'Orb., Voy. dans l'Amér. Mérid., p. 336, pl. 43, figs. 6, 7; Strobel, Mat. Malac. Argent., p. 43, with var. *mendozana*, p. 43, pl. 2, fig. 4.

A very obese, solid species with short spire and very large aperture. Length 35, diam. 25 mm.

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[1] *Cf. Goniobasis comalensis fontinalis*, Proc. A. N. S. Phila., 1906, p. 169.

Rio Negro, thirteen leagues above its mouth, in the channels formed by the river between the numerous wooded islands of the place called San Xavier, in sandy places (d'Orbigny).

The var. *mendozana* Strobel is "smaller, the maximum length 18, diam. 10 mm., six-banded." It is from San Carlos, province of Mendoza.

### CHILINA PUELCHA d'Orbigny.

*Chilina puelcha* d'Orb., Voy. dans l'Amér. Mérid., p. 336, pl. 43, figs. 8–12; Strobel, Mat. Malac. Argent., p. 45.

The shell is oval, thick, yellowish-green, very rarely uniform, but generally marked with waved longitudinal streaks, widened at their forward angles to form three spiral spot-bands. Columella thick, having a very strong fold. Length 20, diam. 15 mm.

Rio Negro, 6 or 7 leagues above its mouth, on stones on the shores, very abundant (d'Orbigny).

### CHILINA PARCHAPPII (d'Orbigny).

*Limneus parchappii* d'Orb., Magazin de Zoologie, 1835, p. 25.

*Chilina parchappii* d'Orb., Voyage dans l'Amérique Mérid., p. 338, pl. 43, figs. 4, 5.

An elongate, thin species, brownish, with four spot-bands, the spire conic and acute, whorls 5; columella typically having a small fold. Length 33, diam. 15 mm.

Pampas between 38° and 39° S. lat., the typical form from the "*Arroyo Salado*" on the slopes of the Sierra de la Ventana, near Bahia Blanca. In the "*Arroyo de las Achiras*" in the same region a very thin variety of uniform color and without a columellar fold was taken by M. Parchappe.

### CHILINA FLUMINEA (Maton).

(Plate XLV, Figs. 35–39.)

*Voluta fluminea* Maton, Trans. Linnean Soc., 1809, X, p. 330, pl. 24, figs. 14, 15.

*Voluta fluviatilis* Maton, l. c., fig. 13.

*Chilina fluminea* Gray, Spicil. Zool., p. 5; d'Orbigny, Voyage dans l'Amér. Mérid., p. 337, pl. 43, figs. 19, 20; E. A. Smith, Proc. Zool. Soc. Lond., 1881, p. 843.

*Duplicaria bonariensis* Rafinesque, Atlantic Journal and Friend of Knowledge, No. V, 1833, p. 165; Binney and Tryon's reprint, p. 93.

A short-oval, inflated shell, with usually olive ground-color, but sometimes olive-yellow or bright green, and either unicolored or marked with one to five spiral bands of dark chestnut spots, alternating with spots paler than the ground-color. The upper bands are more persistent than those below. Very rarely the pattern is of irregularly zigzag streaks flowing from the suture down, not quite reaching the base (fig. 38). The ample aperture is blue-white within, and usually shows the external markings through. The columellar lamella is very strong, and a long entering callous ridge stands on the parietal wall, and is always well developed in adult snails. The specimens figured from San Gabriel's Island, opposite Colonia, Uruguay, measure:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Fig. | 35. | Length | 11, | diam. | 7.9, | length of | aperture | 8.9 | mm. |
| " | 36. | " | 10.25, | " | 7 | " | " | 8.25 | " |
| " | 37. | " | 12 | " | 8.5 | " | " | 9.9 | " |
| " | 38. | " | 10.8 | " | 7.5 | " | " | 9 | " |
| " | 39. | " | 7.8 | " | 5.6 | " | " | 6.8 | " |

Some examples from Buenos Aires are larger, 13.25 mm. long. All adult shells seen have the spire eroded.

Fig. 36 has the pattern of the type of *C. fluminea*. Fig. 35 is the color-form which Maton called *fluviatilis*, but it has no racial characters.[1] Figures 38 and 39 are color-forms hitherto unrecorded. The spots composing the bands vary in size, and are sometimes reduced to mere dots.

Very young shells, 2.25 mm. long, are plain colored, have no parietal fold, and only a very small columellar fold. With growth, the band at the shoulder appears first. No streaked stage precedes the bands.

La Plata (Maton); Buenos Aires (Phila. Acad. coll.); San Gabriel's Island (Dr. W. H. Rush); Rio Colorado (Roca Exped.).

### CHILINA FLUMINEA MICRODON subsp. nov.

(Plate XLV, Figs. 40–44.)

*Chilina fluminea* d'Orb., Heynemann, Malak. Blätter, XV, 1868, p. 112, Taf. 5, fig. 11 (teeth).

*Chilina fluminea* Maton, Martens, t. c., p. 184.

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[1] The name *Voluta fluviatilis* has precedence on Maton's page, but subsequent authors have preferred that of *fluminea*.

Shell similar to *fluminea*, but differing by having the parietal lamella very small and deeply placed; columellar fold smaller than in *fluminea*. The color is bright greenish-yellow, uniform or marked with 5 or fewer spot-bands; rarely it is brown or olive-brown.

| | | | | |
|---|---|---|---|---|
| Fig. 40. | Length 10, | diam. 7.4, | length of aperture | 9 mm. |
| " 41. | " 8.3, | " 6.1 | " " | 7.5 " |
| " 42. | " 12.1 | " 7.7 | " " | 10 " |
| " 43. | " 11 | " 7.1 | " " | 8.9 " |
| " 44. | " 11 | " 7.7 | " " | 9.5 " |

Province of Rio Grande do Sul, Brazil: Guatzbu (H. von Ihering, type loc.); Guahyba at Porto Alegre, common on stones (Dr. Hensel).

Professor von Martens has already referred to the differential features of this race, which inhabits the Jacuhy river system.

As in *C. fluminea*, there is wide variation in the size and prominence of the spire, which may be either very short, as in figs. 40, 41, or wider and much more produced, figs. 42, 43. The tip of the spire is worn away in all the examples seen.

### CHILINA GLOBOSA Frauenfeld.

(Plate XLV, Fig. 45.)

*C. globosa* Ffld., Zoologische Miscellen, in Verhandlung der k. k. zoologisch-botanischen Gesellschaft in Wien, 1866, p. 13.

According to Frauenfeld, this is a round-oval, brownish yellow shell, with three hardly noticeable spot-bands on the last whorl. Columellar lip very thick, covered with a white callus to the upper end, two-toothed. Length 13.8, diam. 10.2 mm.

The example figured is larger, length 16, diam. 12.5, aperture 13.9 mm. long. It is straw yellow, with traces of a spot-band upon a low spiral angle, which crowns the last whorl. It is also stained with iron oxide in front and under the parietal callus. The very heavy columellar callus continues upon the parietal wall, bearing thick, obtuse, parietal and columellar lamellæ.

This species is chiefly distinguished from *C. fluminea* by its very heavy parietal callus.

La Plata States (Ffld.); La Plata (coll. A. N. S. P.).

### CHILINA RUSHII Pilsbry.

(Plate XLV, Figs. 31–34.)

*Chilina rushii* Pils., Proc. A. N. S. Phila., 1896, p. 561, pl. 26, figs. 6, 7.

This species is closely related to *C. fluminea*, but differs by the acute keel at the shoulder. This keel arises rather abruptly at the end of the second whorl; and either runs to the end, or after continuing for several whorls, gradually dies out, leaving the last whorl rounded, as in fig. 33. In a young shell 4.3 mm. long, with 3⅓ whorls, the last whorl only is acutely carinate.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Fig. 31. | Length | 14.3, | diam. | 9.5, | length of aperture | 11 | mm. |
| " 32. | " | 15.25 | " | 11 | " " | 12.3 | " |
| " 33. | " | 11.5 | " | 7.8 | " " | 9 | " |
| " 34. | " | 14.5 | " | 9 | " " | 11.3 | " |
| | " | 22.5 | " | 13.5 | " " | 16 | "[1] |

Uruguay River at Fray Bentos, Uruguay (Dr. Wm. H. Rush, U.S.N.).

### CHILINA PARVA von Martens.

*Chilina parva* v. Marts., Malakozoologische Blätter, XV, 1868, p. 185.

A small, rather thin, globose form with flat spire; brown, obsoletely lightning-streaked; columella having a distinct columellar tooth and a low dentiform swelling below, the parietal callus distinct.

Length 5½–6, diam. 4½–5 mm.; aperture 4½ mm. long.

Province of Rio Grande do Sul, Brazil, at Rödersberg, in small brooks in the forest (Dr. Hensel).

An unfigured species known by the original description only.

### CHILINA PORTILLENSIS Hidalgo.

*Chilina portillensis* Hidalgo, Journal de Conchyliologie, 1880, p. 322, pl. 11, fig. 1.

An ovate, rather solid olive-green shell, marked with darker spiral bands and lines. It has columellar and parietal folds, and evidently is rather closely related to *C. fluminea*. Length 12, diam. 9 mm., length of aperture 9 mm.

Western Argentina at Portillo, 4000 meters elevation.

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[1] Rush collection.

## Family *AMNICOLIDÆ* Tryon.

*Amnicolidæ* Tryon, Proc. Acad. Nat. Sciences of Philadelphia, 1862, p. 147; Gill, Proc. A. N. S. Phila., 1863, pp. 33, 35.

*Hydrobiinæ* Stimpson, Researches upon the Hydrobiinæ and Allied Genera, 1865, p. 4.

*Hydrobiidæ* Fischer, Manuel de Conchyliologie, 1885, p. 723.

This family of minute river-snails has been but little studied or collected in South America. We have some knowledge of the species of the Rio de La Plata system though the work of d'Orbigny, Doering and Strobel and collections made by Dr. W. H. Rush, U.S.N. In southern Brazil Dr. von Ihering has done good work, though hampered by the want of La Platan material for comparison. In Ecuador K. Miller has described a few forms collected by Wolf and others. In the north, Dr. von Martens has recorded a few Venezuelan species. None are known from the Orinoco or Amazon systems. Through the collections of Mr. Hatcher we are now enabled to add several forms from Patagonia. The opportunity has also been taken fully to describe and figure the known species of *Potamolithus*, part of them new forms, most of the rest hitherto defined only by a brief "key" published in 1892. Only six of the thirty species now known have hitherto been figured.

All of the South American genera and species of *Amnicolidæ* are described or referred to below.

The following genera of this family are represented in South America:

*Amnicola* Gould and Haldeman,
*Littoridina* Souleyet,
*Potamopyrgus* Stimpson,
*Idiopyrgus* Pilsbry,
*Potamolithus* Pilsbry,
*Lithococcus* Pilsbry.

Of these genera, *Amnicola* has been found only in the extreme north. *A. ernesti* (Martens) of Lake Valencia, Venezuela, is closely related to *A. panamensis* Tryon and several Mexican species, and is undoubtedly of North American origin.[1]

*Potamopyrgus* is the dominant genus of *Amnicolidæ* in New Zealand and Tasmania. It is unknown in the Oriental region. In America it extends from Argentina to Venezuela, through Mexico to central Texas and throughout the West Indies. This distribution is explicable on the supposition that the genus had its origin in Antarctica, or one of the Austral lands once connected therewith.

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[1] *Hydrobia* (*Amnicola*) *ernesti* Martens, Die Binnenmollusken Venezuelas, 1873, p. 209, Taf. 2, fig. 12.

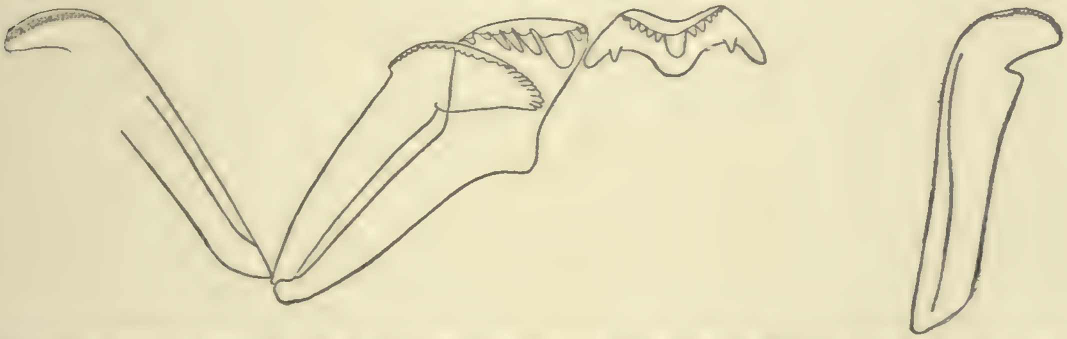
*Littoridina* resembles the Holarctic *Paludestrina* and the genus *Fluviopupa*[1] of Australia and the Melanesian Plateau, but until the external genitalia of all can be compared, no well-founded opinion of the affinities of these genera can be formed.

*Idiopyrgus* is an Archhelenic genus, if my estimate of its affinities is correct.

The affinities of *Lithococcus* are uncertain.

*Potamolithus*, in the form of the shell, closely resembles the genera assembled by Tryon in the subfamily *Lithoglyphinæ: Fluminicola* of western North America, *Lithoglyphus* of eastern Europe, *Pachydrobia*, *Lacunopsis* and *Jullienia* of Indo-China. All of these genera differ from *Potamolithus* by the small number and large size of the cusps of the outer marginal teeth.[2] *Fluminicola* has male genitalia of widely different form. The genus *Petterdiana* of Tasmania and Australia has a strong globular shell, with wide columella, similar to the primitive species of *Potamolithus*. The radula, hitherto undescribed, has the formula $\frac{5,1,5}{1-1}$. 2, 1, 5. 20. 25 (Fig. 6, teeth of a half row, and a detached outer marginal tooth). This

FIG. 6.



*Petterdiana tasmanica* (Tenison-Woods), half row of teeth and an isolated outer marginal tooth.

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[1] *Fluviopupa* n. gen., type *F. pupoidea* (Mousson) of Fiji. The teeth are of the usual shape in *Amnicolinæ*, central with the cusp formula $\frac{5,1,5}{4-4}$, admedian with 10 subequal cusps, marginals with about 30, those of the outer marginal very minute. Shell pupiform, with obtuse summit and convex sides, the aperture ovate, vertical or sloping forward below, the long parietal margin straightened. Operculum thin, with nucleus near the base. Penis unknown. *Hydrobia petterdi* E. A. Smith seems to be congeneric, judging from specimens sent from Manaro, N. S. Wales, by Dr. J. C. Cox. These shells have the appearance of the European *Bythinellæ*, but differ from them in dentition.

[2] See J. Poirer, Journal de Conchyliologie, XXIX, 1881, pp. 1–19.

radula resembles that of *Potamolithus* in the important character of having many minute cusps on the marginal teeth, more than double the number of those on the admedian tooth. It differs from *Potamolithus* by having a single basal cusp or denticle on each side of the central tooth, *Potamolithus* having two or more. I have found the number of basal cusps so variable in many genera that I do not attach much importance to this character. Of all known genera, *Petterdiana* is, in my opinion, the most closely related to *Potamolithus*.

Marginal teeth with a small number of cusps characterize the subfamily *Lithoglyphinæ*. The Austral genera *Potamolithus* and *Petterdiana* cannot be included in this subfamily. They may for the present be placed in the *Amnicolinæ*.

### LITTORIDINA Souleyet.

*Littoridina* Souleyet, Voyage autour du Monde exécuté pendant les années 1836 et 1837 sur la corvette La Bonite, Zoologie, II, p. 565 (1852). Monotypic: type *L. gaudichaudii* Soul.

"*Littorinida* Eydoux et Souleyet" Stimpson, Researches upon the Hydrobiinæ, etc., 1865, p. 43; Fischer, Manuel de Conchyliologie, 1885, p. 730.

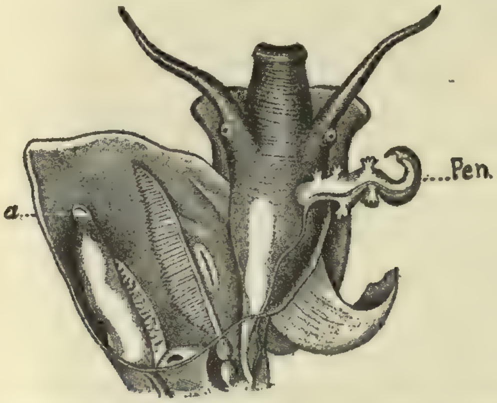
*Paludestrina* in part, d'Orbigny, 1839; Stimpson, 1865.

*Heleobia* Stimpson, Researches upon the Hydrobiinæ, etc., 1865, p. 47. Monotypic: type *P. culminea*.

*Hydrobia* and *Paludina* of some authors.

The shell is small, very narrowly rimate, acutely ovate, thin, smooth or rarely striated spirally, of olive or pale corneous color; whorls usually

FIG. 7.



*Littoridina guadichaudii*, anterior part of the body, the pallial cavity opened and spread to the left. *a*, anus; *Pen.*, penis. (After Souleyet.)

but slightly convex, rarely carinate; aperture ovate, not very oblique, less than half as long as the shell; peristome thin and simple, continuous or interrupted. The operculum is thin, ovate, paucispiral, the nucleus below the lower third and near the columellar margin. The long penis has several digitate lateral papillæ or simple warts, and is curved at the end. The central tooth of the radula has one to four basal denticles on each side. The marginal teeth have very numerous denticles, more than twice as many as the admedian tooth. The animal is oviparous.

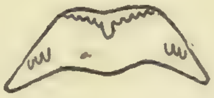
### DENTITION OF LITTORIDINA.

*Littoridina guadichaudii*, the type of the genus, has several, probably four, basal denticles on each side of the central tooth. Souleyet's figure shows five, but allowance must be made for the difficulty of the object and the date, 1852.

Dr. von Ihering found two basal denticles on each side in *L. australis*. For *L. picium* he gives the number $\frac{9}{4-4}$ and *L. charruana* $\frac{11}{1-1}$.

*L. simplex* of the Rio Chico (fig. 8) has a central tooth with the cusp-formula $\frac{5, 1, 5}{3-3}$. The admedian tooth has 6, 1, 6 cusps, the two marginal teeth many, about 30, cusps.

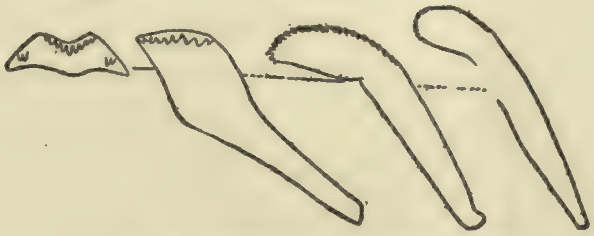
FIG. 8.



Central tooth of *Littoridina simplex* Pils.

*L. hatcheri*, Rio Chico, has the cusp formula $\frac{9}{2-2}$. 8. 25. 30. The cusps of the marginal teeth are so excessively small that their exact number is not certain (fig. 9).

FIG. 9.



Teeth of *Littoridina hatcheri* Pils.

*Littoridina* was based upon a snail from the river of Guayaquil, having a shell resembling *Paludestrina* or *Bythinella*, but differing by the penis, which is not bifid, and has several lateral papillæ or warts.

We owe to Souleyet an excellent account of the anatomy of *L. guadichaudii*, and Dr. von Ihering has published valuable notes on that of several species of southern Brazil. Many other species are referred to *Littoridina* from the resemblance of the shells and their distribution alone. Most of them have been described under genera based upon European types, such as *Paludestrina* and *Hydrobia*, which, so far as we know, differ anatomically from the type of *Littoridina*. Provisionally, therefore, we refer to *Littoridina* all of the smooth, slender and thin oviparous Amnicolinæ of South America, having the lip simple.

Most of the species are fresh-water forms, but a few live as well in the brackish water of estuaries, or even in the salt water of sheltered bays. They are known to extend from below the mouth of Santa Cruz River in Patagonia north to Ecuador in the west, and to the state of Rio Janeiro, Brazil, in the east.

Many species of *Littoridina* have been described from the La Plata system and the Sierras of western Argentina (Provinces of Córdoba and Mendoza) by d'Orbigny,[1] Strobel[2] and Doering,[3] but none have heretofore been reported from the southern territories. Mr. Hatcher's collections extend the range of the genus south to the Mount of Observation, below the mouth of the Santa Cruz River.

Several species of *Littoridina* have both slender and stouter forms, with others of intermediate shape, in any large lot. These differences may be sexual, but no observations bearing on the point have been made. In some other species the contour is nearly uniform.

Various authors having referred the Littoridinæ to d'Orbigny's *Paludestrina*, it may be well to give some account of that genus.

*Paludestrina* was proposed by A. d'Orbigny in 1839[4] for *Paludina acuta* of France and the South American rissoids of fresh and brackish water, having the operculum spiral, such as *P. lapidum*, *P. peristomata* and *P. australis*. Various subsequent authors have mentioned or discussed the group, but no type species seems to have been selected until William Stimpson, in 1865, selected *P. auberiana* d'Orb. as type.[1] Bourguignat in January, 1887, named *P. acuta* Drap. as type of the genus.[2] In 1895 Dr. von Ihering proposed to restrict *Paludestrina* to the group now called *Potamolithus*, with *P. peristomata* as type.[3] This course cannot be followed because of Bourguignat's earlier selection. *P. acuta* (Drap.) must stand as the type of *Paludestrina*.

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[1] Alcide d'Orbigny, Voyage dans l'Amérique Méridionale, Mollusques, 1839.

[2] Pellegrino Strobel, Materiali per una Malacostatica di terra e di acqua dolce dell'Argentinia Meridionale. Pisa, 1874.

[3] Adolfo Doering, Apuntes sobre la fauna de moluscos de la República Argentina, in Boletin de la Academia Nacional de Ciencias en Córdoba, VII, 1884, pp. 465–474 ("*Hydrobia*").

[4] Voyage dans l'Amérique Méridionale, Mollusques, p. 381.

The following names will fall as synonyms of *Paludestrina: Littorinella* Braun, 1846, type *L. acuta* (Drap.). *Ecrobia* Stimpson, 1865, type *Turbo minutus* Totten. The preceding live in brackish water, or in sheltered bays or estuaries, or sometimes where the water is fresh. The exclusively fresh-water groups *Bythinella* Moq., 1851, type *B. viridis* Moq., and *Stimpsonia* Clessin, 1878,[4] type *B. nickliniana* (Lea), are indistinguishable from *Paludestrina* in shell, operculum and dentition, but according to Moquin-Tandon the penis of *B. ferrusina* is bifid, while that of *P. minuta* (Totten) was found to be simple by Stimpson. Until the types of these proposed genera are studied and the forms of their penes ascertained, there seems to be little reason for recognizing more than one genus of these slender Amnicoloid snails in North America and Europe, although it is likely that several may ultimately be defined.

In *Paludestrina* (including *Bythinella*) the central tooth has a single well-developed basal denticle on each side, but often a second one is weakly developed.

### LITTORIDINA HATCHERI sp. nov.

(Plate XLII, Figs. 7, 7*a*, 8, 11–13.)

The shell is minute, imperforate (though slightly rimate), rather solid, olivaceous brown, smooth; in shape ovate or somewhat pupiform. The outlines of the spire are convex; the summit minute, a little obtuse, though the apex is not depressed. Whorls 4, convex, at first slowly, then rapidly widening, the suture therefore descends more rapidly and obliquely in its last volution, and it is also deeper than in those preceding.

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[1] Researches upon the Hydrobiinæ and allied forms, Smiths. Misc. Coll., No. 201, pp. 45, 46. This selection was not valid for the reason that *auberiana* was not one of the species included in *Paludestrina* in d'Orbigny's original publication, but was added some years later.

[2] Étude sur les noms génériques des petites Paludinées à opercule spirescent, pp. 9, 10.

[3] Die Gattung Paludestrina, in Nachrichtsblatt d. d. Malak. Gesellschaft, XXVII, 1895, pp. 122–128.

[4] Malak. Blätter, XXV, 1878, p. 151.

The last whorl is rounded and expands towards the aperture, at the upper angle of which it descends slightly. The aperture is subvertical, symmetrically ovate, narrower but not angular above. The peristome is continuous, of a deep reddish brown color, almost black at the edge. The outer margin is slightly thickened and obtuse; the inner margin is rather heavily calloused, forming a raised ledge across the preceding whorl, from which it is slightly detached above and below.

Length 2.25, diam. 1.2 mm.; length of aperture 1.1 mm. (Pl. XLII, figs. 7, 7*a*).

Rio Chico de la Sta. Cruz, Territory of Santa Cruz, Argentina, from below the mouth of the Rio Chalia to the mouth of the Rio Belgrano; and northward along the eastern slope of the Andes 65 miles, in springs and small streams. Specimens were taken at the following localities: Spring on the Rio Chico below the mouth of the Rio Chalia (2: 12: '99); spring on Rio Chico, 25 miles below Sierra Ventana (type locality); twenty miles below Sierra Ventana, in a spring; north side of Rio Chico near Sierra Ventana; Rio Chico, 40 miles above Sierra Ventana; small stream 5 miles above Sierra Oveja; small stream on south side of Rio Chico, 50 miles above Sierra Oveja; near the mouth of Rio Belgrano; Rio Blanco, base of the Andes; spring 50 miles north of Rio Chico, elevation 1750 ft.; spring near base of the Andes, 65 miles north of the Rio Chico, elevation 2400 ft. Also several lots from springs on the Rio Chico without exact location.

This small snail is evidently abundant in springs and small streams along the whole course of the Rio Chico de la Sta. Cruz. It is apparently related to *L. kuesteri* and especially to *L. k. cordilleræ* (Strobel),[1] from the Province of Mendoza, but differs from these by its wider, convexly conic spire, the shape of *L. hatcheri* being rather pupiform, whereas the spire is strictly conic in *L. kuesteri* and *cordilleræ.*

*L. hatcheri* varies within wide limits in nearly all of the colonies collected. This variation is chiefly (1) in size, nearly every lot consisting of both large and small individuals, the difference being greater than I have ever observed in North American *Amnicolidæ;* and (2) in the degree of descent, lateral deviation or uncoiling of the last whorl. As type I have selected a shell nearly normal in shape, Pl. XLII, figs. 7, 7*a*, 2.25

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[1] *Hydrobia küsteri* and var. *cordilleræ* Strobel, Materiali per una Malacostatica di Terra e di Acqua dolce dell'Argentinia Meridionale, p. 61. Pisa, 1874.

mm. long. Some others in the same lot are smaller and more pupiform, with the parietal callus barely free from the preceding whorl, as in fig. 8, length 1.7 mm. The entire lot from the type locality consists of shells which do not depart much from the normal *Littoridina* contour.

At two stations, 40 and 50 miles above the Sierra Oveja, a considerable proportion of the shells have the last whorl deeply descending to the aperture and becoming free, or partially free near the termination. A series from 40 miles above Sierra Oveja is figured, Pl. XLII, figs. 11, 11*a*, 12, 13. Fig. 12 represents a nearly normal shell; figs. 11, 11*a* and 13, those with the last whorl loosening its coil; all are fully mature, but not old snails. The individuals figured measure:

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fig. | 11. | Length | 3.3, | diam. | 1.7, | length | of aperture | 1.2 | mm.; | whorls | 4¾. |
| " | 12. | " | 2.7 | " | 1.6 | " | " | 1.25 | " | " | 4½. |
| " | 13. | " | 2.1 | " | 1.3 | " | " | 1 | " | " | 4⅓. |

The same tendency is well-marked in a lot from far down the river, below the mouth of the Rio Chalia. The other lots of the species resemble the type lot, having the shape nearly normal, but with a variable proportion of individuals in which the peristome is partly or for a short distance free.

*L. hatcheri* is thus a species distinctly aged or gerontic, with this feature much more strongly emphasized in certain colonies.

### LITTORIDINA SIMPLEX sp. nov.

(Plate XLII, Figs. 9, 10.)

The shell is minutely rimate but scarcely perforate, rather thin, ovate-conic, of a very pale olivaceous-yellowish tint, the apex and first whorl reddish in the type lot, smoothish, but lightly marked with growth-lines. The spire is straightly conic, the apex minute and very slightly obtuse. Whorls 4½, all rather strongly convex, regularly enlarging, and joined by an impressed suture, which on the last whorl or two shows a narrow faint margination below caused by transparence. The aperture is ovate, subvertical. Peristome continuous, its edge delicately marked with a brownish line. The outer lip curves forward a little in the middle, and has a very delicate whitish thickening within. Inner margin thickened a little, continuous, in contact with the preceding whorl.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fig. | 9. | Length | 3, | diam. | 1.8 | mm., | length | of aperture | 1.3 | mm. |
| " | 10. | " | 3 | " | 2 | " | " | " | 1.5 | " |

Springs along the Rio Chico de la Sta. Cruz, at the following places: About 15–20 miles above the mouth of the Rio Chalia; springs 20 and 25 miles below the Sierra Ventana; spring near the Sierra Ventana (type locality); 25 and 50 miles above the Sierra Oveja. Also near Mt. of Observation, on the coast, below the mouth of the Santa Cruz River. Also at the foot of the Andes, 50 miles north of the Rio Chico.

This species resembles several forms of the Rio de La Plata system, but is distinguished by the combination of quite strongly convex whorls and a continuous peristome; its inner margin, though not much thickened, yet forms a distinct ledge across the preceding whorl. The striation is exaggerated in fig. 9, and the umbilical chink is represented too wide and prominent in both figures. The apex is reddish in the type lot, but not in others. *L. simplex* occurs in the same springs with *L. hatcheri* along the Rio Chico, but it is apparently less abundant and it does not seem to ascend the river so far.

### LITTORIDINA SUBLINEATA sp. nov.

(Plate XLVI*a*, Figs. 5, 5*a*.)

The shell is imperforate, ovate-pyramidal, thin, light brown. Surface faintly marked with growth-lines, and on the last half of the last whorl there are several (four or five in the type specimen) very low spiral cords, grouped in the peripheral region. The spire is rather straightly conic, the summit a little obtuse, the apex rising but little above the level of the first whorl. Whorls 5, convex, the last very indistinctly angular below the periphery, causing the base to appear slightly flattened. The aperture is ovate, very slightly oblique; peristome thin and acute, the outer margin not darkened or thickened. Columella concave, slightly thickened, continued in a thin adnate callus across the parietal wall.

Length 3.6, diam. 2.2 mm., length of aperture 1.5 mm.

Small stream on the Rio Chico, 35 miles above the Sierra Oveja (type locality); also in a spring 25 miles above the Sierra Oveja, and in a "big spring on the Rio Chico," the exact location of which was not noted on the collector's label.

It sometimes attains a larger size than the type, a shell from the second lot noted above being 5.4 mm. long with 5½ whorls. This species differs from *L. simplex* by its weakly subangular periphery, marked with a few spiral lines, the less prominent parietal callus and fragile outer lip.

### Littoridina australis (d'Orbigny).

(Plate XLI*c*, Figs. 3–8.)

*Paludina australis* d'Orb., Mag. de Zool., 1830, p. 30.

*Paludestrina australis* d'Orb., Voyage, p. 384, pl. 48, figs. 4–6 (Bahia Blanca and Bahia de San Blas, Patagonia, on water plants and mud covered by each tide; also at Montevideo); von Ihering, Nachrichtsblatt, XXVII, 1895, p. 123, anatomy (Rio Grande do Sul and Sao Paulo); von Martens, Malak. Blätter, XV, 1868, p. 192 (Porto Alegre).

*Melania dubiosa* Clessin.

d'Orbigny gives the dimensions, length 6, diam. 3 mm., whorls 7. Fig. 7, drawn from a specimen from Bahia Blanca, the type locality, is of this size. Some examples are narrower (fig. 6), and others much larger, length 8.5 mm. (fig. 5). The whorls are almost flat except in the largest shells, where the last whorl is convex. Under a strong lens very faint spiral striæ may be seen on most examples. Figures 5–7 represent bleached shells from Bahia Blanca, the type locality, received from Dr. von Ihering.

At Montevideo, in a creek in the Prado, the shells taken by Dr. Rush are large, olivaceous, with noticeably more convex whorls. They measure:

Length 8.3, diam. 4, length of aperture 3.5 mm.; whorls 8.
" 8.2 " 3.9 " " 3.2 " " 7½.
" 8.4 " 3.9 " " 3.3 " " 8¼.

In a small spring back of the Cerro, Montevideo, the shells are similar but smaller, about 5 mm. long with 6½ whorls.

Shells from Rio Grande do Sul, sent by Dr. von Ihering, are about 6 mm. long, 2.3 to 2.9 mm. in diameter. The more slender shells are less numerous than the stouter ones, and some are transitional in shape. The color varies from dark to pale olive (Plate XLI*c*, figs. 3, 4, 8). A small form has been sent also from Ilha Comprida, near Iguape, on the Sao Paulo littoral.

*Melania dubiosa* Clessin, judging from specimens sent from S. Leopoldo, State of Rio Grande do Sul, by Dr. von Ihering, is identical with the large form of *L. australis* noticed above from Montevideo.

## Littoridina charruana (d'Orbigny).

(Plate XLI*c*, Figs. 1, 2.)

*Paludestrina charruana* d'Orb., Voy., p. 384, pl. 75, figs. 1, 2 (at the embouchure of a stream into the sea north of Montevideo); von Ihering, Nachrbl., 1895, p. 123, anatomy (Iguape, Sao Paulo).

A shorter, stouter snail than *L. australis*, the cuticle olive, with black growth-arrest lines in old shells. It varies widely in shape, as may be seen by figs. 1, 2, which represent average, stout and slender shells from the Rio Cubatao, near Santos, State of Sao Paulo. They measure:

Length 5.8, diam. 3.5, aperture 2.6 mm.; whorls 6.
" 5.7 " 3.1 " 2.5 " " 7.
" 5 " 2.7 " 2.2 "

It has also been sent by Dr. von Ihering from the Ribeira at Iguape and from Guatzbu, State of Rio Grande do Sul, where the shells are more slender.

d'Orbigny's type measured, length 5, diam. 3 mm., whorls 6.

## Littoridina picium (d'Orbigny).

(Plate XLI*c*, Fig. 13.)

*Paludina picium* d'Orb., Mag. de Zool., 1835, p. 30.

*Paludestrina picium* d'Orb., Voyage, p. 383, pl. 47, figs. 17–21 (Rio de La Plata at Buenos Aires, etc., under stones); von Ihering, Nachrbl., 1895, p. 123, anatomy (Rio Grande do Sul); von Martens, Malak. Blätter, XV, 1868, p. 192 (Rödersberg).

This is smaller and thinner than *L. charruana*, less opaque, of a paler greenish yellow or olive-corneous tint. The whorls are rather strongly convex, the suture well-impressed, having a grayish border below. d'Orbigny gives the size as length 3, diam. 2 mm., whorls 5. Two from San Gabriel's Island, in the Rio de La Plata off Colonia, Uruguay, measure:

Length 4, diam. 2.2, aperture 1.8 mm.; whorls 6.
Fig. 13. " 4 " 2.4 " 1.8 " " 5¾.

Specimens are before me also from the type locality, Buenos Aires, agreeing fully with those figured.

*Littoridina glabra* (Tryon) from Bolivia resembles *L. picium*, but it is somewhat more slender, thinner, the columella less calloused.

### LITTORIDINA BERTONIANA sp. nov.

(Plate XLI*c*, Fig. 9.)

The shell is barely perforate, oblong-turrite, pale olivaceous, the length about double the greatest diameter, and two and one-half times the length of the aperture. Spire rather straightly conic, the apex obtuse. Whorls 5⅓, moderately convex, the last well rounded. Surface delicately marked with very fine spiral striæ, usually strongest on the penultimate whorl. The aperture is ovate, angular above. Peristome thin and simple, continuous, the columellar margin narrowly expanded.

Length 3.6, diam. 1.7, length of aperture 1.4 mm.

Puerto Bertoni, Paraguay. Types No. 103,045, A. N. S. Phila., from No. 244 of the Museu Paulista, collected by A. de W. Bertoni.

This species differs from *Potamopyrgus peteningensis* (Gld.) by its much less convex whorls, smaller size and minute spiral striæ. *Potamopyrgus scottii* has far more convex whorls and coarser sculpture.

In some specimens from the type locality the spiral striæ are extremely minute and weak, yet visible under the compound microscope. These were sent under No. 190 Museu Paulista.

A few other species at present referred to *Littoridina*, such as *L. pedrina* Miller, have spiral sculpture; yet the presence of this unusual feature raises some doubt as to the genus, which can be definitely determined only by examination of the genitalia. *L. bertoniana* may prove to belong to *Potamopyrgus*.

### OTHER SPECIES OF LITTORIDINA DESCRIBED FROM SOUTH AMERICA, SOUTH OF THE EQUATOR.[1]

LITTORIDINA ISABELLEANA (d'Orbigny). *Paludestrina isabelleana* d'Orb., Voy., p. 385, pl. 75, figs. 4–6. 3 × 1 mm., whorls 6, flat. In a stream near Montevideo and in the Bay of Montevideo at the contact of fresh and salt water.

LITTORIDINA PARCHAPPII (d'Orbigny). *Paludina parchappii* d'Orb., t. c., p. 30; *Paludestrina parchappii* d'Orb., Voy., p. 383, pl. 48, figs. 1–3. 6.5 × 3 mm. with 7 very convex whorls; whitish, aperture not angular posteriorly. Streams in the pampas south of Buenos Aires as far as Bahia Blanca, especially in the Rio Salado and Arroyo Salado in 30° S. lat. *Hydrobia parchappii* Doering, Bol. Acad. Cienc. Córdoba, VII, 472.

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[1] This list is believed to be a complete catalogue of the genus up to the end of 1909. *Paludina brunnea* and *P. conica* Anton, Verzeichniss, 1839, p. 52, South America, and *Bulimus paludinoides*, Ibid., p. 42, are probably Littoridinæ, but the descriptions are totally inadequate and the names should be deleted from the list of species.

LITTORIDINA KUESTERI (Strobel). *Hydrobia küsteri* Strobel, Mater. Malac. Argent., 1874, p. 61, pl. 2, fig. 6. 4 × 2.5 mm., 5 whorls, to 3.5 × 2–2.5 mm. San Carlos ed Aguanda, province of Mendoza, in stagnant water. *Hydrobia küsteri* var. *cordilleræ* Strobel, t. c., p. 61, pl. 2, fig. 7. 3 × 1.5–2.5 × 1.33 mm., 4¼ whorls. Sierra de Mendoza.

LITTORIDINA AMEGHINI (Doering). *Hydrobia ameghini* Doering, Bol. Acad. Cienc. Córdoba, VII, pp. 466, 469. 7–9 × 3.5–4 mm., whorls 7½. Pampean formation, Lujan, Argentina.

LITTORIDINA OCCIDENTALIS (Doering). *Hydrobia occidentalis* Doering, t. c., pp. 466, 471. 6 × 2.7 mm., whorls 6. San Luis, Mendoza, San Juan, Santiago, Argentina.

LITTORIDINA MONTANA (Doering). *Hydrobia montana* Doering, t. c., pp. 467, 473. 4.5 × 2 mm., whorls 6. Sierras de Córdoba and S. Luis, Argentina.

LITTORIDINA GLABRA (Tryon). *Hydrobia glabra* Tryon, American Journal of Conchology, I, p. 222, pl. 22, f. 12. Bolivia.

LITTORIDINA CUMINGII (d'Orbigny). *Paludina cumingii* d'Orb., Mag. de Zool., 1835, p. 30. *Paludestrina cumingii* d'Orb., Voy., p. 385, pl. 47, figs. 14–16. 6 × 2 mm., whorls 6. In fresh-water streams near Callao and at Valparaiso.

LITTORIDINA ATACAMENSIS (Philippi). *Paludina atacamensis* Philippi, Reise durch die Wüste Atacama, 1860, p. 185, Taf. 7, fig. 15. Length 1⅛ lines, whorls 5. Tilopozo, Chili, in about 23°, 20′ S. lat.

LITTORIDINA POPOENSIS (Bavay). *Paludestrina popoensis* Bavay, Bull. Soc. Zool. France, 1904, p. 154, fig. 5. Conic, 5 × 2.5–3.5 mm., with 6 to 7 rounded whorls. Lake Popo, Bolivia.

LITTORIDINA CUZCOENSIS n. sp. (figs. 10, 11). The shell is minutely perforate or rimate, thin, corneous-white, smooth and glossy. Spire straightly conic, whorls 6, moderately convex, the last evenly rounded. Aperture ovate, slightly oblique. Peristome thin and simple.

| | | | | | | |
|---|---|---|---|---|---|---|
| Fig. 10. | Length 4.9, | diam. 2.5, | length of aperture 1.8 mm. | (typical). |
| " 11. | " 4.8 | " 2.2 | " " 1.6 " | (slender phase). |

Cuzco, Peru (H. von Ihering).

This species evidently stands close to *L. popoensis* Bavay, of the saline Bolivian Lake Popo; but the spire seems to be of a more turrite shape, the last whorl comparatively shorter in *L. popoensis*, which moreover belongs to a different drainage.

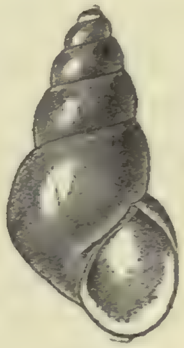


FIG. 10.

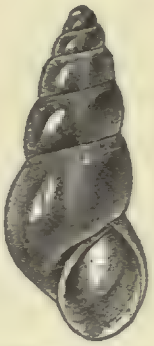


FIG. 11.

Compared with *L. culminea* of Lake Titicaca, this species differs by the less attenuate spire and fewer whorls. *L. cuzcoensis* is not very closely related to the Titicaca species.

LITTORIDINA NEVENI (Bavay). *Pyrgula neveni* Bavay, Bull. Soc. Zool. France, 1904, p. 155, fig. 6. Last three whorls strongly carinate. 5 × 3 mm. with 6½ whorls. Lake Titicaca.

LITTORIDINA ANDICOLA (d'Orbigny). *Paludina andicola* d'Orb., t. c., p. 29. *Paludestrina andicola* d'Orb., Voy., p. 385, pl. 47, fig. 13. Bavay, Bull. Soc. Zool. France, 1904, p. 153, fig. 2. 8 × 3 mm. with 8 flat whorls, the last acutely carinate. Lake Titicaca.

*Littoridina andicola*, ecarinate form: *Paludestrina culminea* d'Orb., Voy., p. 386, pl. 47, figs. 10–12. 6 × 3 mm., whorls 7, somewhat convex. Lake Titicaca.

Some specimens of the *L. culminea* type, collected by A. Agassiz in Lake Titicaca, are subangular at the periphery, and therefore somewhat intermediate between *L. culminea* and *L. andicola*. Bavay has figured a series of shells showing the intergradation of these supposed species.

LITTORIDINA GUADICHAUDII Souleyet, Voyage la Bonite, Zoologie, II, p. 565, pl. 31, figs. 31–33 (living animal, shell and operculum), pl. 32, figs. 9–19 (soft anatomy). 5 × 3 mm., 6 whorls. River of Guayaquil, Ecuador.

LITTORIDINA ECUADORIANA (Miller). *Paludestrina ecuadoriana* Miller, Malak. Blätter, n. F., I, 1879, p. 153, Taf. 8, f. 3. 7 × 3–4 mm., whorls 6. Guayaquil River, Guayaquil, Ecuador.

LITTORIDINA BOETZKESI (Miller). *Paludestrina boetzkesi* Miller, t. c., p. 155, Taf. 8, fig. 4. 4.5 × 2.4 mm., whorls 6½. S. Domingo and Guayaquil River, Ecuador. *Cf. L. guadichaudii.*

LITTORIDINA (?) PEDRINA (Miller). *Hydrobia pedrina* Miller, t. c., p. 155, Taf. 6, f. 7. 3.5 × 1.5 to 4 × 1.8 mm., 5½ to 5¾ whorls. Microscopically granulose. Rio Pedro in the Chillo valley, Ecuador.

## POTAMOPYRGUS Stimpson.

*Potamopyrgus* Stimpson, American Journal of Conchology, I, 1865, p. 53; Researches upon the Hydrobiinæ, Smiths. Misc. Coll. No. 201, p. 49. Monotypic; type, *Melania corolla* Gld.

*Lyrodes* Doering, Bol. Acad. Nac. Ciencias Córdoba, VII, 1884, p. 461. Type *L. guaranitica.*

*Pyrgophorus* Ancey, Bulletin de la Société Malocologique de France, V, 1888, p. 192. Type, *Pyrgulopsis spinosa* C. & P.

*Huttonia* Johnson, Proc. Royal Society of Tasmania for 1890, p. 90 (1891). Type, *Potamopyrgus corolla.*

Amnicolinæ with rather slender, thin, rimate shells of ovate-conic or turrited contour, often armed with a row of spines on a delicate keel at the shoulder of the last whorl or two. They differ from other American genera in being viviparous.

Besides the following species, *P. coronatus* Pfr. is known from Baranquilla, Colombia, and Lake Valencia, Venezula. It has a wide range in Mexico and the West Indies. Professor von Martens has figured the shell, teeth and embryonic young. (Die Binnenmollusken Venezuelas, p. 208, Taf. 2, figs. 13*a–h.*)

### POTAMOPYRGUS GUARANITICUS (Doering).

*Lyrodes guaranitica* Doering, Boletin de la Academia Nacional de Ciencias en Córdoba (República Argentina), VII, 1884, pp. 461–463, fig. 2.

Length 3.5, diam. 1.9 mm., whorls 5½, the last encircled by a slender keel at the shoulder, and several spiral striæ on the base.

Rio Barrancas, Corrientes.

### POTAMOPYRGUS SCOTTII sp. nov.

(Plate XLI*c*, Figs. 10, 11.)

The shell is very minutely perforate, turrite, the length about double the greatest diameter and nearly three times the length of the aperture. The spire has straight outlines and an obtuse apex. Whorls 6½, very convex, parted by a deep suture. The first two whorls are smooth; then fine, narrow, thread-like, spiral striæ appear, 6 to 8 in number on the visible part of each whorl, one at the upper third sometimes being more prominent. There are also numerous ripples in an axial direction, on the last two whorls. The last whorl is well rounded and nearly smooth on the base. The aperture is ovate, peristome simple and thin, continuous, the columellar margin concave, narrowly reflexed.

Fig. 10. Length 5, diam. 2.6, length of aperture 1.7 mm.
" 11. " 3.8 " 1.9 " " 1.4 "

Buenos Aires. Types No. 10,153 A. N. S. P.

This is a very much lengthened form, larger and longer than *P. guaraniticus* (Doer.), and differs in sculpture. It is closely related to *P. peteningensis* (Gld.) which, however, has a smooth surface. The specimens are bleached and apparently fossil, being filled with sandy mud. A minute embryonic shell was obtained from the matrix washed out of one of the specimens figured. This confirms the generic reference to some extent, as all *Potamopyrgus* species are viviparous.

Named for Professor W. B. Scott, whose work has thrown a flood of light on Patagonian vertebrate palæontology.

### POTAMOPYRGUS PETENINGENSIS (Gould).

(Plate XLI*c*, Fig. 12.)

*Cingula peteningensis* Gould, U. S. Expl. Exped., Mollusca, p. 130, pl. 9, figs. 152, *a*, *b*.

Lagoa de Peteninga, near the entrance of Rio Janeiro harbor, in brackish water.

The shell of this species resembles *Paludestrina attenuata* of the eastern United States by its extremely convex whorls parted by deep sutures. The type, from the Lagoa de Peteninga, was described as smooth, about 8.5 mm. long, 2.5 wide, with 6 whorls. One of the original lot is figured (fig. 12). It measures 5.4 mm. long, 2.4 wide, the aperture 1.8 mm. long, and is composed of 6⅓ whorls. The apex is very obtuse. Another lot, received from G. von Frauenfeld, contains shells slightly more slender than that figured. In one of them I found two minute embryonic shells.

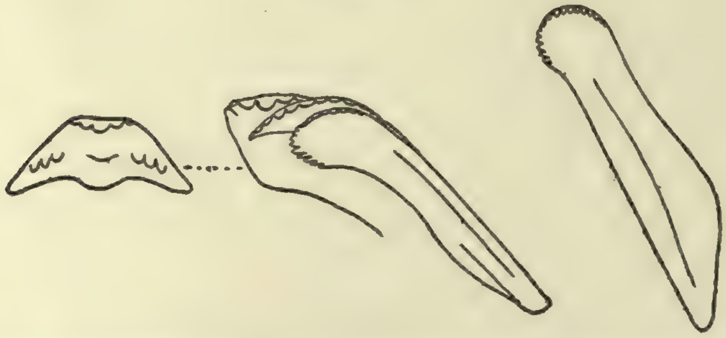
## IDIOPYRGUS gen. nov.

The shell is perforate, solid, turrite, with long spire of very convex whorls; aperture diagonal, oval, its plane sloping forward below, posterior end rounded, sinused; a small sinus at junction of the outer lip with the basal margin. Lip slightly expanded, thickened within. Operculum paucispiral, with the nucleus at the lower fourth, near the columellar margin. Radula having the formula $\frac{5}{3-3}$. 7. 9. 16.

Type, *I. souleyetianus*.

The snail for which this genus is proposed differs from all known species of *Littoridina* by its internally thickened, somewhat expanded and bisinuate peristome, the diagonal aperture, and by having fewer cusps on the upper reflection of the central teeth, as well as on the marginal teeth. The scoop-like shape of the outer marginal tooth is also rather peculiar.

Fig. 12.



*Idiopyrgus souleyetianus*, half row of teeth and an isolated marginal tooth.

*Idiopyrgus* has some resemblance to the Dalmatian genus *Lanzaia* Brusina, and to the Mexican *Pterides* Pilsbry. In all of them the long axis of the aperture stands strongly diagonal to that of the shell, the posterior end of the aperture is rounded, effuse or sinused, the lip expands more or less, and the whorls of the tapering spire are strongly convex. These apertural characters are so unusual in *Amnicolidæ*, that I am disposed to view them as indications of real relationship between the three genera, rather than convergent structures in snails otherwise diverse.

Unfortunately *Lanzaia* and *Pterides* are known by dead and bleached shells only, so that the relationship suggested remains hypothetical. It affords no safe basis for deductions concerning the antecedents of the three groups, each known from a single spot, and separated from its supposed relatives by thousands of miles.

The genera are characterized as follows:

Common characters: — Shell turrite, composed of very convex whorls; aperture strongly diagonal to the axis of the shell, oval, the posterior end rounded, spreading or sinused, the basal margin also retracted or effuse; peristome continuous, more or less expanding, running forward below.

*a.* Shell openly umbilicate, thin, *sculptured with sinuous longitudinal ribs and fine spiral striæ*, minute (2 to 3 mm. long, with 6 whorls); the aperture elliptical, lip broadly flaring. Dalmatia. *Lanzaia* Brusina.

*b.* Shell rimate, thin, *smooth*, minute (2.5 to 3 mm. long, with 7 to 10 whorls); the aperture ovate; lip sinused or spreading above, broadly retracted or spreading at the base. Mexico. *Pterides* Pilsbry.

*c.* Shell perforate, solid, smooth, of about 7½ whorls; the aperture oval, small, the lip having a rounded sinus above and a smaller one at junction of outer and basal margins, which expand but little. Southeastern Brazil. *Idiopyrgus* Pilsbry.

### IDIOPYRGUS SOULEYETIANUS sp. nov.

(Plate XLI*c*, Figs. 14, 14*a*.)

The shell is perforate, solid, turrited, greenish-yellow, opaque. The surface is smooth and glossy, growth-lines very faint. The spire tapers regularly to a small but obtuse apex. Whorls 7½, all strongly convex, joined by deep sutures. The aperture is oval, oblique, the *basal margin being advanced*, the outer lip retracting upward. The peristome is continuous, the outer lip expanded, somewhat thickened within. It has a rounded sinus just below the upper insertion, and a small sinus at the junction of the outer and basal margins. The continuous columellar and parietal margins are arcuate, forming a raised ledge across the parietal wall.

Length 5.3, diam. 2.1 mm., length of aperture with peristome 1.9 mm.

Rio Doçe, State of Espirito Santo, Brazil. Types No. 100,534, A. N. S. Phila., from No. 127 Museu Paulista.

In old individuals the spire becomes more or less shortened by erosion of the early whorls. This form differs from the Littoridinas by its peculiar peristome. It is probably a straggler from the fauna of eastern Brazil, of which little is yet known.

## POTAMOLITHUS Pilsbry.

*Paludestrina* in part, d'Orbigny, Voyage dans l'Amérique Méridionale, Mollusques, p. 381.

*Lithoglyphus* sp., of some authors.

*Potamolithus* Pils., Nautilus, X, Nov., 1896, p. 80.

Amnicolidæ with the shell imperforate, solid, ovate or globose, smooth or 1–3 carinate, covered with a thick cuticle, which is usually green or olive; aperture ovate or rounded, the peristome continuous; columella concave, more or less heavily calloused.

Operculum lodging some distance within the aperture, corneous, oval, reddish-brown, opaque, with a thinner, yellowish border along the basal, outer and upper margins. It is composed of about 2 whorls, the nucleus near the lower third, and nearer the columellar side. The outer face is slightly concave and rather strongly striate. Inner face is glossy except for a long dull scar of attachment near the columellar margin (*P. rushii*).

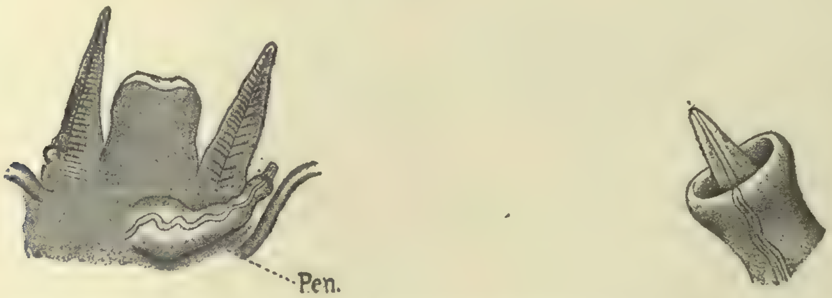
Penis simple, terminating in a small glans surrounded by a fleshy preputial ring.

The radula has teeth of the form usual in *Amnicolidæ*, central tooth with 2 to 4 basal cusps on each side, admedian tooth armed with 8 to 10, marginal teeth having many cusps, 17 to over 30.

Type *P. rushii* Pilsbry.

Distribution, La Plata drainage and faunally similar streams draining into the Atlantic in Sao Paulo and Rio Grande do Sul, Brazil.

FIG. 13.

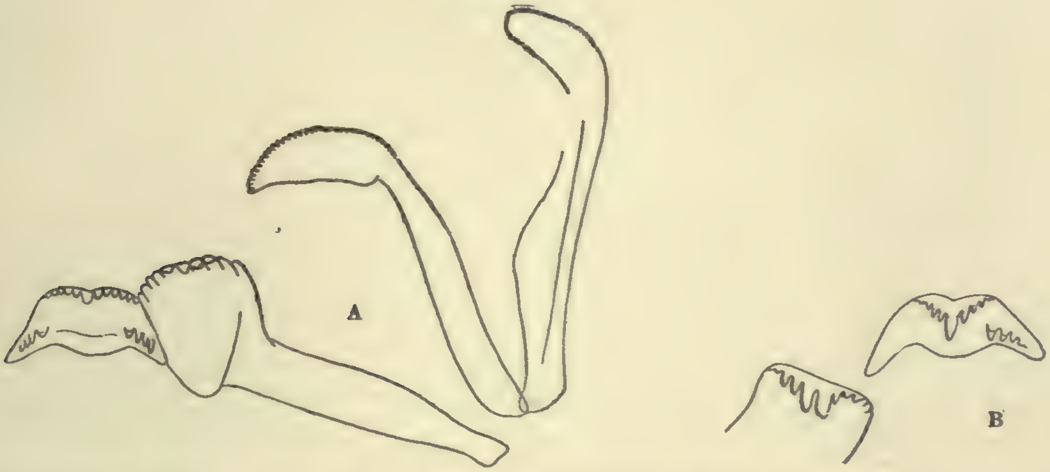


Head, showing tentacles and penis, and end of the penis of *Potamolithus*. (After von Ihering.)

The soft anatomy is known from A. d'Orbigny's figures of living *P. lapidum* and H. von Ihering's description and figures of a form from near the mouth of the Santa Maria River, of the Rio dos Sinos drainage, identified as *P. lapidum.*[1] In this form "the penis is inserted nearly on the median line of the back of the neck (fig. 13). It was not found for a long time, because the number of females far exceeded the males among the animals examined. It is very broad at the base, provided with an obtuse hump and runs somewhat coiled towards the right side, where its summit lies near the base of the tentacle. It is perforated throughout by the vas deferens, and terminates in a slender conical point, which is encircled by a sort of prepuce."

*Dentition of Potamolithus.* — I have examined the teeth of *P. rushii* and *P. lapidum supersulcatus.* The former (fig. 14) has teeth with the formula $\frac{6.1.6}{4-4}$. 10. 33. 40. The middle cusp of the central tooth is long but rather narrow, and the side cusps are small. The cusps of the admedian tooth are of about equal width, but are longer in the middle, as shown in fig. 14, *B.* On the inner marginal tooth the cusps are extremely small and numerous, and on the outer they are still more numerous.

FIG. 14.



*Potamolithus rushii, A,* the teeth of a half row, somewhat pressed backward, foreshortening the cusps, especially of the marginal teeth. *B,* central and cusp of the admedian teeth, in their normal positions.

In *P. lapidum supersulcatus* from Fray Bentos on the Uruguay River (fig. 15) the formula is $\frac{5,1,5}{2-2}$. 8 (4, 1, 3.) 17. 18, or in another radula, the central tooth has the cusp-formula $\frac{5,1,5}{3-3}$. All of the teeth have much larger cusps than in *P. rushii,* and on the admedian tooth the median cusp is much longer than its fellows. All of the teeth have the same general shape as those of *P. rushii*, the difference in the figures being chiefly due to the side teeth being shown in their natural positions, while in *P. rushii* they are drawn from a frayed radula, as is usually done in allied genera.

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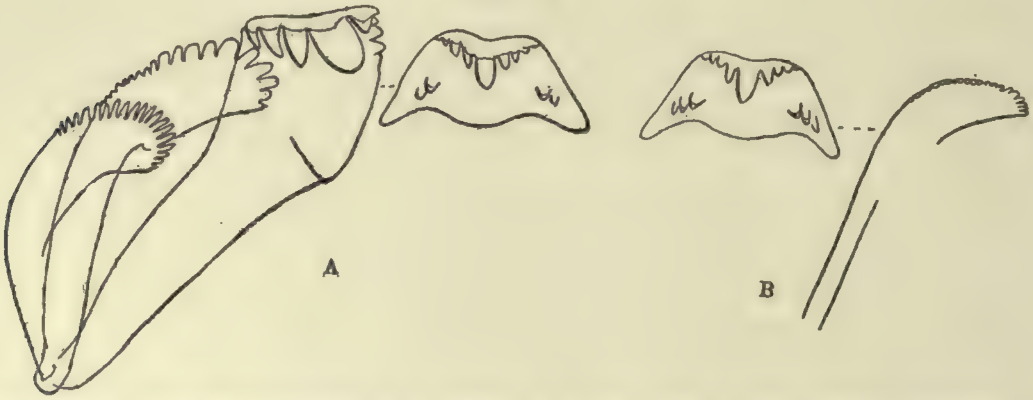
[1] Malakozoologische Blätter, n. F., VII, 1885, pp. 96–99.

The teeth of a form from the Santa Maria River, a tributary of the Sinos, identified as *P. lapidum* (probably not that but an allied species) have been figured by Dr. H. von Ihering, as having two basal teeth on each side. The figure is somewhat diagrammatic, but shows teeth resembling *P. l. supersulcatus*.

FIG. 15.



*Potamolithus lapidum supersulcatus*, *A*, the teeth of a half-row in their normal positions. *B*, central and outer marginal teeth of another individual.

The eggs are deposited in plano-convex chitinous capsules about .6 or .7 mm. in diameter, adhering to shells and probably stones. The embryonic shell is smooth, Naticoid or globular in probably all of the species. So far as I can see, it is quite continuous with the neanic stage. In all of the species studied, the earlier portion of the neanic stage is also Naticoid. In some forms this shape persists to maturity, but in others angles or carinæ set in, their appearance dividing the period of youth into two or three substages; so that a highly specialized form may pass successively through rounded, singly carinate, bicarinate, tricarinate, and finally varicose stages. The degrees to which these sculpture-conditions are accelerated and the stage finally reached, allow us to fix the relationships and evolutionary grade of the several forms with some degree of accuracy, in species where the young stages are accessible.

These little river snails live on and under stones, at and below low-water mark, often in copious numbers. Up to this time, they have been collected at comparatively few places, yet the range of the genus probably embraces the whole La Plata drainage, together with some rivers flowing directly into the Atlantic, but having their rise adjacent to or interposed between the head streams of the Uruguay and Paraná Rivers. Many new forms doubtless remain to be found, since only an inconsiderable part of the waters of the Plata system have been explored for mollusks.

To what extent the specific characters of the forms vary from place to place, we cannot say, since most of them are known from a single locality. *P. lapidum*, which has been assigned a wide range, seems to vary with locality, and probably several species will eventually be recognized in what is now considered *lapidum*. Of most of the forms, many specimens have been studied, some of them by hundreds, and I have been astonished at the absence of intermediate or ambiguous individuals, such as one finds in the fresh-water *Pleuroceratidæ* or *Melâniidæ*. It is however well known to those who have studied large quantities of fresh-water snails, that the *Amnicolidæ* are generally conservative; the specific features are crystallized, while in the Melanians they are fluid.

## SIGNIFICANCE OF THE CHARACTERS OF POTAMOLITHUS.

In the *Amnicolidæ*, as in the *Viviparidæ*, the prevalent genera almost everywhere are smooth-shelled forms with rounded or convex whorls. Such forms have prevailed since the first appearance of these families. In those *Amnicolidæ* which are sculptured in the adult stage, the early (embryonic and early neanic) stages are smooth or nearly so. These facts apparently point to the conclusion that smooth, rounded shells are primitive and sculptured shells derivative in these families.

Throughout Neocene time, carinate, varicose or otherwise strongly sculptured species or genera of these families have frequently appeared, but their distribution has been local and their duration brief. In some cases the genesis of these sculptured or distorted forms from smooth and normal types has been traced, as in the case of *Viviparus hoernesi* of the Pliocene of southeastern Europe, and *Viviparus altior* and *limnothauma* of the Floridian Pleistocene. At the present time, sculptured *Viviparidæ* and *Amnicolidæ* are comparatively rare and confined to small areas. *Margarya* in Lake Tali, *Tulotoma* in the Coosa River, *Pyrgulopsis* in Pyramid Lake, Nevada, and *Tryonia* in a very restricted area in the Southwest, are familiar examples. To these may be added the group of carinate species of *Potamolithus* in the Uruguay River. In all of these cases, the distribution of the forms is very restricted, often to a single lake, or a few springs; and in some cases, as *Pyrgulopsis* and *Tryonia*, we have evidence that the species had a wider range in the Pleistocene and are now apparently approaching extinction.

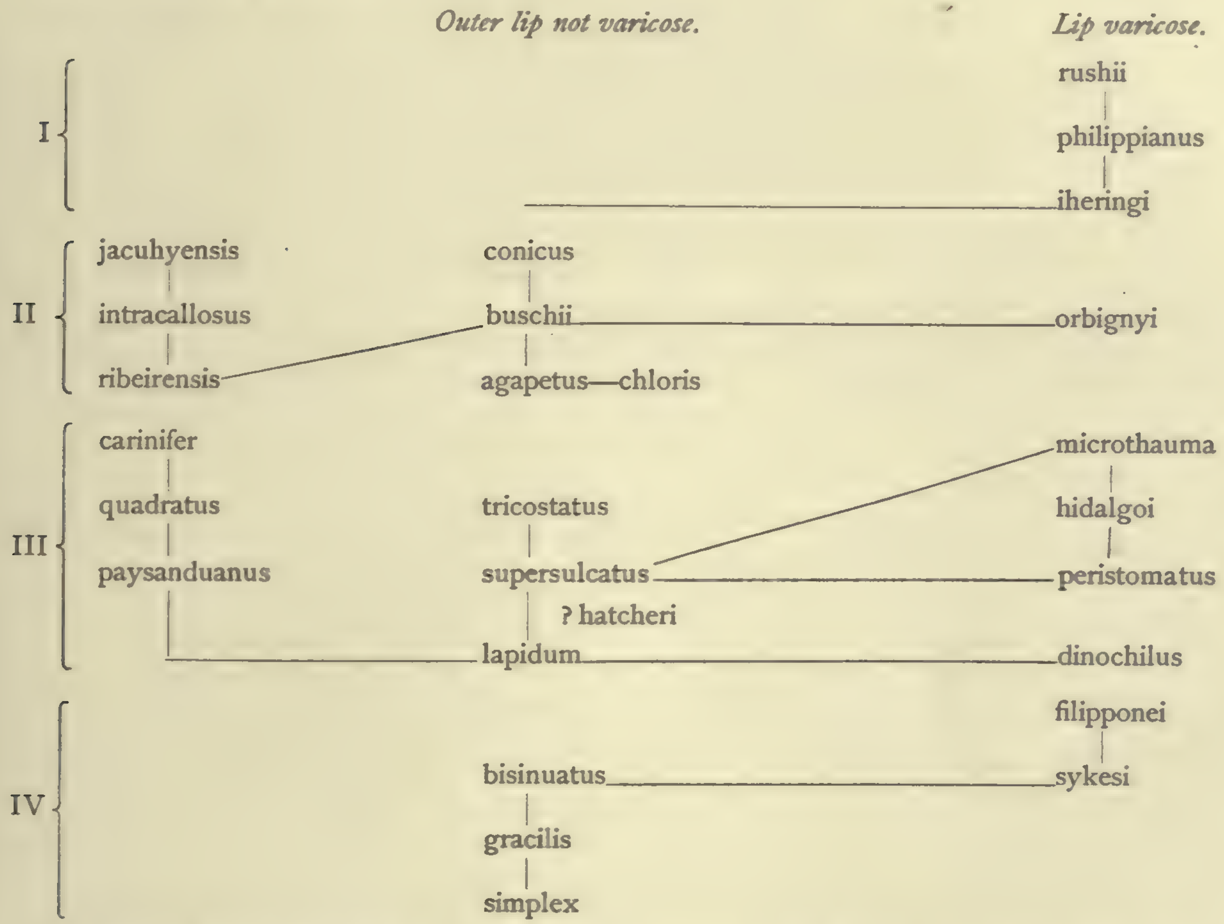
The facts indicate that in *Amnicolidæ* and *Viviparidæ*, shell-sculpture is a phylogerontic character, showing the approach of senility of the race; strongly developed sculpture in a species signalizes its last incarnation.

The considerations advanced above go to show that the present *Potamolithus* fauna consists in large part of species which in an evolutionary sense are aged, are more or less distinctly gerontic or senile. Over 80 per cent. of the species have characteristics which indicate, as experience has shown, that they represent side lines of evolution, impotent to continue the phylum, or to give birth to new phyla. There remains also a small group of unspecialized species represented by *P. lapidum* of the Paraná and its allies in southern Brazil.

I have been unable to find a shred of evidence to connect the development of sculpture in these fresh-water snails with the concentration or increased alkaline content of waters they inhabit, as some conchologists have assumed. It is doubtful whether any such modified forms inhabit alkaline or saline waters, while it is positively known that most of them do not. *Amnicolidæ* which live in brackish or sea water are not strongly sculptured, but as smooth as their congeners in fresh water. Examples of this are found in certain species of *Paludestrina* (*P. minuta* (Tott.), *P. acuta* (Drap.), *P. salsa* Pils.) and *Littoridina* (*L. australis* (d'Orb.), etc.). It is extremely likely that these are forms of fresh-water origin, which have become adapted secondarily to more or less saline waters. Part of them live also in perfectly fresh water.

## INTERRELATIONS OF THE SPECIES OF POTAMOLITHUS.

The species now known belong to four collateral phyla, each comprising forms in several very diverse stages of specialization. The less differentiated species in each phylum retain in adults a globular or Naticoid shell without keels or angles, and in three of the groups have the lip simple and unspecialized. This type of shell is common to other genera of the subfamily. In all of the phyla some species have developed orthogenetically a varix or crest at the lip; the shape of the shell is profoundly altered by spiral keels in some species. These modifications are more or less exactly parallel in the several series. I have attempted to express the above ideas graphically in the following diagram, in which the least evolved species of each group are placed below, while the carinate forms are placed above in each group.


Outer lip not varicose.
Lip varicose.
I
rushii
philippianus
iheringi
II
jacuhyensis
intracallosus
ribeirensis
conicus
buschii
agapetus—chloris
orbignyi
III
carinifer
quadratus
paysanduanus
tricostatus
supersulcatus
? hatcheri
lapidum
microthauma
hidalgoi
peristomatus
dinochilus
IV
filipponei
bisinuatus
gracilis
simplex
sykesi

[In these diagrams the most primitive, Naticoid species of each group are below; those modified by the development of carinæ above; and the right-hand column contains derivative species having the outer lip varicose. The connecting lines indicate the chief affinities of the forms.]

While the above diagrams are not intended for phylogenetic trees, all the species being contemporaneous, yet it is likely that the ancestral forms in groups II, III and IV did not differ materially from the least differentiated of the recent species. It is significant that the only form known to have a wide distribution, *P. lapidum*, is one of the least specialized of the genus.

The evolution of carinæ and varices in the several groups seems to have been homoplastic. It will be shown below that the keels are superposed upon the Naticoid form much earlier in some species than in others; and judging from these various degrees of acceleration, it would seem that the specialized species are of unequal antiquity.

## Key to Species and Subspecies of Potamolithus.

- I. Columella wide, having a longitudinal furrow excavated in its face. Latter part of the suture not more rapidly descending; outer lip strengthened by a strong varix.
  - *a.* Last whorl dominated by a very strong peripheral keel. *P. rushii.*
  - $a^1$. Last whorl flattened peripherally, without carina. *P. philippianus.*
  - $a^2$. Last whorl rounded, conspicuously banded with green. *P. iheringi.*
- II. No longitudinal groove in the face of the columella.
  - *a.* Outer lip well expanded or with a prominent varix; not notched or sinuous.
    - *b.* Periphery strongly keeled, the keel visible on part of the penultimate whorl.
      - *c.* Three keels on the last whorl. *P. microthauma.*
      - $c^1$. Last whorl flattened above and below the peripheral keel. *P. hidalgoi.*
      - $c^2$. Last whorl globose, convex above and below the peripheral keel. *P. peristomatus.*
    - $b^1$. Periphery obtuse or rounded.
      - *c.* Lip-varix very strong; periphery hardly angular, base convex; back with a spiral rib below the suture; no columellar area. *P. dinochilus.*
      - $c^1$. Lip-varix narrow; last whorl without keels, except that around the columellar area. *I. orbignyi.*
  - $a^1$. Outer lip simple or slightly contracted, without an external varix, the edge not sinuous.
    - *b.* Last whorl sculptured with spiral keels or angles.
      - *c.* With a single keel or angle at the basal periphery, none above it.
        - *d.* High-trochiform, flattened above and below the strong carina, much higher than wide; columella narrow. *P. conicus.*
        - $d^1$. Obliquely trochiform, convex above the peripheral angle, about as wide as high; columella wide. *P. buschii.*
      - $c^1$. Trochiform, with a carina at the basal periphery and two contiguous keels on the back above. *P. tricostatus.*
      - $c^2$. Trochiform, with a strong carina at the median periphery, the slope above it flat, with a small carina at the upper third; no distinct umbilical area. *P. carinifer.*
      - $c^3$. Stout keels at both periphery and shoulder, giving the last whorl a squarish contour; umbilical area ample; spire very short. *P. quadratus.*
      - $c^4$. Base and periphery rounded, a shallow sulcus or two low ridges on the back above. *P. lapidum supersulcatus.*
      - $c^5$. Back of last whorl with two contiguous angles, the upper one stronger, base rounded, spire rather slender and high. *P. hatcheri.*
    - $b^1$. Last whorl rounded, without keels, angles or sulci.
      - *c.* Shape approaching globular, the spire short or very short, conic.
        - *d.* Columella narrow; last whorl evenly rounded.
          - *e.* Green or olivaceous; alt. 5, diam. 4 mm. *P. lapidum.*
          - $e^1$. Yellow, alt. 3.3, diam. 3 mm. *P. paranensis.*

            - $e^2$. Three-banded with reddish; alt. 4, diam. 3 mm. Paraná River. *P. petitianus.*
        - $d^1$. Columella and especially the parietal wall thick, forming a blackish ledge; spire very short.
            - $e$. Last whorl swollen below the suture; olivaceous, about 5 × 4 mm. *P. paysanduanus.*
            - $e^1$. Last whorl evenly rounded; olive with black markings, alt. and diam. 7 mm. *P. doeringi.*
        - $d^2$. Columella wide, flat and white; last whorl evenly rounded.
            - $e$. Pale green, diameter nearly equal to the alt., 3 × 2.8 mm. *P. agapetus.*
            - $e^1$. Pale green, higher than wide, alt. 3, diam. 2.5 mm. *P. chloris.*
            - $e^2$. Olivaceous, perforate, alt. 5.7, diam. 4.3 mm. *P. catharinæ.*
            - $e^3$. Reddish brown, alt. 3.5, diam. 3.4 mm. *P. ribeirensis.*
            - $e^4$. Naticoid, but with an obtuse prominence on the columella far within. *P. intracallosus.*
        - $d^3$. Last whorl noticeably flattened peripherally; solid, brown, becoming green at the base and behind the lip; 6 × 5.6 mm. *P. jacuhyensis.*
    - $c^2$. Acutely long-ovate in shape, smooth, the ovate aperture not much exceeding half the total length; 4.3 × 3 mm. *P. simplex.*
- $a^2$. Outer lip sinuous, nicked or notched.
    - $b$. Trochiform, the periphery very strongly carinate, aperture squarish, umbilical area large. *P. filipponei.*
    - $b^1$. Shell nearly globular, the diameter about equal to the alt., smooth, swollen below the suture, lip with a sinus above. *P. paysanduanus sinulabris.*
    - $b^2$. Shell globose-conic.
        - $c$. Outer lip strongly expanded, with swollen, thickened and three-notched face. *P. sykesi.*
        - $c^1$. The outer lip thin, with deep subsutural and basal sinuses; 4.8 × 3.3 to 5 × 3.9 mm. *P. bisinuatus.*
        - $c^2$. Similar, but with the sinuses shallower, the upper one often inconspicuous. *P. bisinuatus obsoletus.*
    - $b^3$. Shell acutely ovate-conic, about 4.3 × 2.7 mm., the outer lip thin, sinuated, especially at the base. *P. gracilis.*

### GROUP OF P. BISINUATUS.

Smooth, globose-conic or ovate-conic species, with no trace of spiral angles or sulci, except in *P. filipponei;* the outer lip usually sinuous. The spire is longer than in other groups of the genus.

### POTAMOLITHUS FILIPPONEI von Ihering.

(Plate XLI*a*, Figs. 8, 8*a*.)

*Potamolithus filipponei* von Ihering, Nautilus, XXIV, June, 1910, p. 15.

The shell is imperforate, pyramidal, olive colored, with a weak reddish-brown spiral band in the middle of the penultimate whorl. Surface smoothish, weakly marked with lines of growth. Whorls 5, the first very minute and dark, following whorls strongly convex, the last whorl strongly carinate, concave above and below the carina, convex on the upper surface. The base is excavated or concave between the peripheral keel and a second prominent keel which bounds a large, funnel-shaped umbilical area. The aperture is very oblique. Peristome continuous, the outer lip thin, unexpanded, having small rounded sinuses below the suture, below the peripheral angle, and at the base of the columella. The columella is narrow, very little thickened, straight, much longer than the short, thick parietal margin.

Length 4.4, diam. 4 mm.

Montevideo, Uruguay, type in the Museu Paulista, collected by Dr. Florentino Filippone.

This species has some resemblance to *P. hidalgoi*, from which it differs by the entirely different shape of the aperture, the swelling between keel and suture, etc. The bisinuate outer lip, the texture and color-pattern of the shell, etc., show it to be a carinate member of the group of *P. bisinuatus*. Described and figured from the type specimen.

### POTAMOLITHUS SYKESI Pilsbry.

(Plate XLI, Figs. 1–2*a*.)

*Potamolithus sykesi* Pilsbry, Nautilus, X, p. 88, Dec., 1896.

The shell is imperforate, globose-conic, rather solid, yellowish olive, smooth and glossy, faintly marked with growth lines. The spire is conic, truncate at the summit in adult shells of the type lot, about 3½ moderately convex whorls remaining. The last whorl is evenly convex, smooth, and expands strongly at the lip. There is a narrow umbilical crescent. The aperture is very oblique and subcircular. The outer lip is strongly expanded, built forward and convex beyond the expansion, and then contracted, with three deep notches in its margin, one near the upper insertion, another median, the third wider and basal in position. The columella and parietal wall are moderately calloused, and the whole peristome is dusky or blackish.

Length 4.9, diam. 3.9 mm.
" 4 " 3.5 "

Uruguay River at Paysandú.

*Development.*—The neanic stage in this species is like that of *P. bisinuatus.* The ephebic stage is described above. A single gerontic individual before me has built the median region of the outer lip forward, obliterating the median notch of the lip (Pl. XLI, figs. 2, 2*a*).

This remarkable form is the most advanced of the *bisinuatus* phylum known. It resembles *P. bisinuatus* in contour, and neanic shells of the two species are distinguishable only by the bands of the latter, when these are developed. The ephebic stage differs widely by the strong expansion of the outer lip, its thickened and thrice notched face.

What relation *P. bisinuatus* and *P. sykesi* bear towards *P. petitianus* (d'Orb.) of the Paraná River is unknown, pending the discovery of the adult stage of the latter, the specimen described and figured by d'Orbigny being supposed to be immature. It is likely that *petitianus* will prove to be different from either of the other species.

### POTAMOLITHUS PETITIANUS (d'Orbigny).

*Paludestrina petitiana* d'Orb., Voyage dans l'Amérique Méridionale, Mollusques, p. 487, pl. 75, f. 19–21 (1839).

Shell short, ovate-inflated, thin, smooth, not umbilicate; spire short, eroded, with obtuse summit, composed of five convex, narrow whorls, parted by a suture which is not very deep. Aperture oval with simple margins. Color green, with three reddish bands, one on the convexity of the spire, the others at the suture and anterior. Alt. 4, diam. 3 mm. (*d'Orbigny*).

Paraná River at San Pedro, Argentina, collector unknown.

This may be the neanic stage of a species allied to *P. bisinuatus;* but in this group of forms (*bisinuatus* and *sykesi*) the neanic stage shows no specific differentiation, the specific characters appearing only in the final stage of development. Until the adult form of *P. petitianus* is collected at the type locality, San Pedro on the Paraná, no good purpose will be served by uniting either of the other species to *petitianus* as its hypothetical adult. There remains also the possibility that *P. petitianus* is a permanently undeveloped form, not passing beyond the neanic stage of the bisinuate species, and therefore falling more properly in the *lapidum* group. Compare also *P. paranensis*, p. 589.

### POTAMOLITHUS BISINUATUS Pilsbry.

(Plate XLI, Figs. 6–*7a*.)

*Potamolithus bisinuatus* Pilsbry, Nautilus, X, p. 88, Dec., 1896.

The shell is imperforate, globose-conic, moderately solid, green or pale yellowish-green, sometimes one-colored, but usually begirt with three narrow reddish-brown bands, one bordering the suture, another above the periphery, and on the penultimate whorl visible above the suture, and the third band below the periphery. The nearly smooth surface is weakly marked with lines of growth. The spire is conic and rather high, truncated at the summit in all adult shells seen, by the erosion of the early whorls, about 3½ remaining. These are strongly convex, the last one globose, without keels or angles of any kind, and with no expansion or varix behind the outer lip. There is a distinct and concave but quite small columellar area. The aperture is moderately oblique, round-ovate, white or brownish inside. Its posterior angle is more or less filled with a callous deposit. The peristome is edged with a black line. The thin outer lip has a deep rounded sinus near its posterior insertion, and there is a second sinus, wider and not so deep, at the base, the lip projecting as a broad truncated lobe between the two embayments. The columella is concave, narrowly calloused and the parietal callus is rather thick.

Length 5, diam. 3.9, length of aperture 2.8 mm.
" 4.8 " 3.3 " " 2.9 "

Uruguay River at Paysandú. Types collected by Dr. W. H. Rush, U.S.N., May 7, 1892.

*Development.*—The shell is of the ordinary simple Naticoid shape throughout the neanic stage, differing from *P. lapidum* only in having a longer spire. The peculiar Pleurotomoid sinuosities of the peristome have their origin and development wholly in the ephebic stage. In this respect, *P. bisinuatus* is like *Pachycheilus dalli* Pils., and differs widely from *Gyrotoma* and *Pleurotoma*, in which the anal notch appears very early.

This species is related to *P. sykesi*, from which, however, it differs totally in characters of the ephebic stage.

### POTAMOLITHUS BISINUATUS OBSOLETUS Pilsbry.

(Plate XLI, Figs. 3–5.)

*Potamolithus bisinuatus obsoletus* Pilsbry, Nautilus, X, p. 88, Dec., 1896.

The shell is more slender than *P. bisinuatus*, acutely ovate-conic, green, without color bands. The outer and basal margins of the peristome have only shallow sinuses in place of the deep ones of *P. bisinuatus;* the upper one is often hardly perceptible, and, when developed, is nearer the upper insertion of the lip than in *bisinuatus.* The inner margin of the peristome is less heavily calloused, and the columellar area is excessively narrow, hardly noticeable. The apices are perfect in the type lot, the shell consisting of 5½ whorls.

Length 4.9, diam. 3.5 mm.; aperture 2.8 mm. long.
" 4.6 " 3.1 "

Rio de La Plata, at San Gabriel's Island, near Colonia, Uruguay. Also Uruguay River, at Fray Bentos, Uruguay.

A large series from the first locality shows this form to be constantly unlike *P. bisinuatus.* It has the characters of an immature stage of the latter.

### POTAMOLITHUS GRACILIS Pilsbry.

(Plate XLI, Figs. 8, 8*a*.)

*Potamolithus gracilis* Pilsbry, Nautilus, X, p. 88, Dec., 1896.

The shell is imperforate, acutely ovate-conic, solid but not thick, olive-yellow, becoming reddish-brown on the spire, or dull green; smooth and glossy. The spire is straightly conic, rather acute. Whorls 5½, moderately convex, the last symmetrically rounded. The aperture is ovate, subvertical. The outer lip is not expanded, acute, the edge sinuous, being retracted slightly at the suture, a trifle sinuated in the middle, and having a distinct rounded sinus at the base. The columella is concave and narrow, the parietal callus thin. There is no differentiated umbilical area.

Length 4.3, diam. 2.7, length of aperture 2.25 mm.

Uruguay River at Paysandú. Types collected by W. H. Rush, U.S.N., July 18, 1892.

This species is related to *P. bisinuatus*, but it is unlike that species in its narrower contour. A long series has been examined. The green specimens predominate.

### POTAMOLITHUS GRACILIS VIRIDIS Pilsbry.

(Plate XLI, Figs. 9, 9*a*.)

*Potamolithus gracilis viridis* Pilsbry, Nautilus, X, p. 89, Dec., 1896.

This form is similar to *gracilis* in contour, etc., but there is a deeper sinus near the upper termination of the lip, and the basal sinus is well developed. The color is green. The dark maculæ shown in the figure are due to the dried soft parts.

Rio de La Plata, at San Gabriel's Island, near Colonia, Uruguay.

### POTAMOLITHUS SIMPLEX sp. nov.

(Plate XXXIX, Figs. 6, 6*a*.)

The shell is acutely ovate-conic, thin, but rather solid, pale greenish-yellow; the surface glossy, faintly marked with growth-lines. The spire is straightly conic, apex rather acute. Whorls 5½, convex, the last evenly globose, not expanded at the lip. There is a distinct and rather wide flat axial area, bounded by a delicate keel. The suture is deep and descends briefly and rather abruptly close to the aperture. The aperture is oblique and acutely ovate. Peristome simple, thin, black-edged and continuous, its edge even, not in the least sinuous or notched. The columella is very narrow and concave.

Length 4.3, diam. 3, length of aperture 2.25 mm.

Uruguay River at Paysandú.

The slender ovate contour and smooth surface ally this species to *P. gracilis*, but the total absence of any sinus or notch in the lip, the anterior descent of the suture and the well developed axial or umbilical area are features unlike *P. gracilis*. No young individuals have been identified, but they probably could not be distinguished from *P. gracilis*. *P. simplex* approaches *Littoridina* in contour, but the anteriorly descending suture and the axial crescentic area are unlike that genus.

## GROUP OF P. BUSCHII.

### POTAMOLITHUS AGAPETUS sp. nov.

(Plate XL, Figs. 10, 10*a*.)

The shell is imperforate, globular-conic, of a rather light green color. The surface is smoothish, faintly marked with growth-lines. Spire short and conic, the apex obtuse. Whorls 4, convex, the last evenly rounded, without keels or angles, the suture shortly deflexed at the aperture. There is a moderate or narrow and usually rather conspicuous columellar area. The aperture is oblique, rather broadly ovate. The peristome is thickened within, the basal and outer margins are evenly and strongly arcuate, the outer becoming straightened near the upper angle of the aperture. The inner lip is heavily calloused; columella rather wide and flattened.

Length 3, diam. 2.8 mm.

Rio de La Plata, at San Gabriel's Island, near Colonia, province of Colonia, Uruguay. Types, 69,683, A. N. S. P.

*Development.* — The young of about three whorls and 2 mm. diameter are essentially similar to the adult stage in shape. The columella is somewhat wider in proportion.

This is the smallest *Potamolithus* now known. It has the globular shape of *P. lapidum*, but the wide columella of the neanic stage shows that *P. agapetus* is related to *P. buschii.* It differs from *P. buschii* by the evenly rounded shape of the last whorl, the diminutive size and clear green color, as well as by the total absence of a peripheral angle or keel; but the young stages of *P. buschii* are not always readily distinguishable from immature *P. agapetus.*

In some shells the aperture is smaller than in that figured, by reason of a greater descent of the last whorl immediately behind the lip. The columellar crescent varies from quite narrow, almost linear, to quite wide and concave.

### POTAMOLITHUS CHLORIS sp. nov.

(Plate XLI*b*, Figs. 8, 8*a*.)

The shell is imperforate, rather solid, ovate conic, light green, the spire paler, summit corneous. The spire is straightly conic, apex minute, slightly obtuse. Whorls 4½, convex, the last evenly rounded throughout, expanding near the aperture. The aperture is very oblique, shortly oval. The peristome is slightly expanded, obtuse. Columella and parietal wall heavily calloused, the former flattened, rather wide.

Length 3, diam. 2.5 mm., length of aperture 1.8 mm.

Salto das Cruzes, Rio Tiete, State of Sao Paulo, Brazil. Type, No. 103,046, A. N. S. P. from No. 106 Museu Paulista. Collected by Hasemann, 1908.

This snail has the texture, color and size of *P. agapetus*, from which it differs by the longer, *Amnicola*-like shape and the small aperture. There is no differentiated umbilical area.

### POTAMOLITHUS BUSCHII (Ffld.).

(Plates XL, Figs. 11–14; XLI*b*, Fig. 3.)

*Lithoglyphus buschii* Dunker, Frauenfeld, Zoologische Miscellen, V, in Verhandlungen der k. k. zoologisch-botanischen Gesellschaft in Wien, 1865, XV, p. 530, Taf. 11, first two figures.

The shell is obliquely trochiform, being flattened below, semiglobose above; moderately solid; green or olive-green with irregular buff flecks or zigzag streaks, and usually a dusky-brown band midway between the periphery and suture. Surface with faint growth-lines and indistinct spiral striæ. Spire very short, the apex usually reddish. Whorls 4½, convex, the first one or two usually eroded in adult shells. The last whorl is carinate, strongly angular, or with a rounded angle at the basal periphery, very convex above the keel, and usually having a low ridge on the back a short distance below the suture; there is also, sometimes, a second obtuse ridge below the upper one (fig. 13), much as in *P. lapidum supersulcatus*. Base flattened, but slightly convex. There is a well developed concave columellar area bounded by an acute ridge. The aperture is very oblique, ovate, the outer lip without a varix, but built downward somewhat near and at the upper angle, contracting the aperture. The columellar and parietal margins are heavily calloused; columella rather wide, concave and flattened.

Length 4.7, diam. 4.6 mm.
" 4.3 " 4 "

Mouth of the Arroyo San Juan, where it empties into the La Plata, Province of Colonia, Uruguay (type locality); San Gabriel's Island in the La Plata, near Colonia, in the same Province, and Fray Bentos on the Uruguay River (Wm. H. Rush).

*Development.*—At the end of the second whorl the periphery begins to be weakly angular, the shell being about 2 mm. in diameter. Before that stage the shape is globose-depressed, with a rounded periphery. At the end of the third whorl the angle is strong. The columella is very broad, its face concave, throughout the neanic stage. Figs. 11, 11*a* represent a young shell 3.3 mm. in diameter.

*P. buschii* is related to *P. agapetus*, but it attains a larger size, and differs in the coloration and angular periphery; yet there are some immature specimens in the lot from San Gabriel's Island, which approach very near to *P. agapetus*. It differs from *P. lapidum* and *P. tricostatus* by its wide columella at all stages of growth. It is a very abundant snail at San Gabriel's Island, on the northern shore of the Rio de La Plata.

The figures on Plate XL represent the least angular forms of the species from San Gabriel's Island. The type was a carinate shell, such as that represented in Plate XLI*b*, fig. 3, from Fray Bentos, on the Uruguay River. The ridge below the suture on the back is usually inconspicuous. Most of the specimens from San Gabriel's Island are similar to those figured on Plate XL, or somewhat more angular, but less so than shells from the mainland. They also have the ridges or sulcus on the back more strongly developed in some examples.

### POTAMOLITHUS CONICUS (Brot).

(Plate XL, Figs. 8, 9, 9*a*.)

*Lithoglyphus conicus* Brot, Journal de Conchyliologie, XV, 1867, p. 69, pl. 1, fig. 5 (Uruguay River in the Province of Entrerios).

The shell is high-trochiform, rather straightly conic, solid, green or brownish-olive, variegated with pale green or yellow zigzag streaks. The smoothish surface is rather glossy, with the usual fine growth-lines. The conic spire is longer than in related species, and often eroded at the apex. Whorls nearly 4½, convex. The last whorl slopes steeply and with little convexity to the carinate periphery, which is basal in position. On the back there is sometimes a very weak ridge below the suture and parallel to it, but this is usually wanting. The base is flat, and there is a rather wide crescentic, concave columellar area defined by a sharp angle. There is no varix at the lip. The aperture is very oblique, symmetrically ovate, in fully adult shells is contracted somewhat, being filled in above; with a continuous, black-edged peristome. The columella is concave and narrow.

Length 4.7, diam. 3.7 mm.
" 3.9 " 3.3 "

Uruguay River at Paysandú, Uruguay, under stones at extreme low water.

*Development.*—The youngest shells at hand lack about one whorl of completion. At this stage the shape is practically that of adults, except that there is no columellar crescent and the columella is wide and flat. The weak subsutural ridge, when developed at all, appears on the back of the last whorl only. The most fully developed shells therefore have the characters of the four-whorled stage in *P. tricostatus*, while most shells, wanting the upper keel, are like *tricostatus* at the three-whorled stage.

*P. conicus* differs from *P. tricostatus* by its smaller size, more highly conic shape, and the less developed sculpture of the last whorl. It is more closely related to *P. buschii*, both having the columella wide during the neanic stage; but in the adult stage *P. buschii* is depressed and *P. conicus* elevated in shape.

The color in life is probably always more or less green. The rich brown tint of those figured may be due to change in alcohol, though I am not sure that this is the case, as the shells were dry when they came into my possession. A lot of *P. buschii* which had been in alcohol have changed to brown, while all of those dried fresh are green.

### POTAMOLITHUS ORBIGNYI Pilsbry.

(Plate XL, Figs. 1–5.)

*Potamolithus orbignyi* Pilsbry, Nautilus, X, p. 88, Dec., 1896.

The shell is imperforate, globose, solid and strong. Uniform olive colored, or with brown bands below the suture and in the middle of the last whorl, on an olive or green ground. Surface smoothish, with faint growth-lines and fine, very indistinct spiral striæ. The spire is very short and conic. Whorls nearly 4½, strongly convex, the later third of the last whorl descending more rapidly. The last whorl is squarish, obtusely biangular, being shouldered above, flattened in the middle, and more or less angular at the basal periphery. The ample crescentic columellar area is concave and bounded by an angle. The lip is strengthened by a narrow varix, which is blackish and bevelled to the lip-edge. The aperture is very oblique, and rounded-ovate. The outer lip is thickened within, the inner lip heavily calloused. The columella is broad and flattened.

Length 5, diam. 4.8 mm.
" 4.5 " 4.5 "

Uruguay River, at Paysandú, Uruguay. Types, No. 69,696, A. N. S. P.

In the typical form of the species the flattening of the last whorl is nearly vertical below the shoulder. In other examples (Pl. XL, figs. 2, 3) the flattened surface slopes steeply, and the periphery is somewhat more angular, though still rounded off. Young shells (Pl. XL, figs. 4, 4*a*) with 3½ whorls, having a diameter of 2.5 mm., have a distinct flattening above the periphery, though less marked than in adults. This was not seen by my artist, who drew the peripheral region of fig. 4 much too regularly rounded. Fig. 5 represents a slightly larger shell, diam. 2.8 mm., the basal aspect drawn to show the very broad, flat, columellar callus. In contour it resembles fig. 2.

*P. orbignyi* is somewhat related to *P. dinochilus*, but differs in the lower varix, absence of a spiral ridge below the suture, the larger columellar area, broader columella, etc. It is similar to *P. philippianus* in shape, but lacks the columellar furrow of that species.

### POTAMOLITHUS JACUHYENSIS Pilsbry.

(Plate XXXIX, Figs. 3, 3*a*.)

*Potamolithus jacuhyensis* Pilsbry, Nautilus, XII, p. 113, Feb., 1899.

The shell is globose, solid and strong, smoothish, with the usual slight growth lines and scarcely visible spirals; covered with a strong, rich brown cuticle, becoming more reddish towards the apex, and dark green below the last turn of the suture, behind the lip, and at the base. Spire short and conic. Whorls 4½, those of the spire convex, the last very obtusely biangular, being flattened peripherally, subangular at the shoulder, flattened and sloping above it, and tapering basally. There is in some specimens a well-developed flattened columellar crescent, but in other individuals it is reduced and inconspicuous. The aperture is large and somewhat spreading, moderately oblique and irregularly semicircular. The outer lip is sharp, with a dark line at the edge, not expanded, and not in the slightest degree varicose or contracted. The inner lip is heavily calloused.

Length 6, diam. 5.6 mm.

Jacuhy River, Rio Grande do Sul, Brazil. Types, 61,820, A. N. S. P., collected by Dr. H. von Ihering.

No immature stages are represented in the series before me. The species belongs to the more primitive or youthful group, by its simplicity of form, the absence of varices, and the want of contraction at the mouth. It is not closely related to any of the La Plata drainage forms, but has some resemblance to *P. lapidum*, from which it differs by the obtusely biangular shape, the much larger aperture, and the heavily calloused columella, which allies it to species of the Uruguay system, and those following.

### POTAMOLITHUS INTRACALLOSUS sp. nov.

(Plate XLI*b*, Figs. 9, 9*a*.)

The shell is imperforate, solid, globose with short, conic spire, olive-green, blackish in the axial region. Surface very lightly marked with growth lines. Whorls 4½, convex, the last strongly convex below the suture and at the periphery, which is below the middle, somewhat flattened above the periphery; base convex; an acute keel divides off a crescentic umbilical area. The suture descends slightly near the aperture. The aperture is ample, oblique, very shortly oval. The peristome is black-edged, not expanded. The continuous columellar and parietal margins are very heavily calloused, the columella broad and flattened. In oblique view in the aperture, a broadly rounded prominence is seen in the middle of the columella.

Length 3.7, diam. 3.5 mm., length of aperture 2.7 mm.

Hiririea, Rio Ribeira, State of Sao Paulo, Brazil. Type, No. 103,047, A. N. S. P., from No. 2037 of the Museu Paulista. H. von Ihering.

This small species of the *P. buschii* group is notable for its very broad columella, with an internal node or rounded prominence. This last feature differentiates it from *P. ribeirensis*, which closely resembles *intracallosus* in shape.

### POTAMOLITHUS RIBEIRENSIS sp. nov.

(Plate XLI*b*, Figs. 6, 7.)

The shell is imperforate, rather solid, globose, red-brown, with a faint olivaceous tint near the outer lip; sculpture of indistinct growth-lines only. Spire short, conic. Whorls 3½, convex, the last globose, most convex at the periphery and just below the suture, the intervening surface somewhat flattened in some examples, but strongly convex in others. The periphery is very indistinctly subangular in front, but in fully adult shells this is often scarcely noticeable. The base tapers and is not very convex. The suture descends very slightly in front. There is an extremely narrow umbilical area. The aperture is oblique and ample, angular above. The outer lip is thin and acute, and forms a half-circle. The columella is very heavily calloused, its face flat or excavated, with a longitudinal depression. Parietal callus heavy within, thin and adnate at the edge.

Length 3.5, diam. 3.4 mm.; length of aperture 2.7 mm.

Rio Ribeira, Yporanga, State of Sao Paulo, Brazil. Types collected by R. von Ihering, 1908.

This form resembles *P. lapidum* (d'Orb.) in shape, but differs by its very broad columella and diminutive size. It is rather closely related to *P. buschii*, though differing by the rounded periphery, which even in immature shells shows the hardly noticeable trace of an angle. *P. intracallosus* is an allied species.

A series of eight shells from Hiririea, Rio Ribeira, State of Sao Paulo, collected dead, but not bleached, has been submitted by Dr. von Ihering. The cuticle is olive-green or clear green. The shape is about as in *ribeirensis*. In several shells there is a very narrow umbilical area, defined by a raised line. In the youngest shells, diam. 2 mm., the columella is very wide, as in *ribeirensis*, but in the largest shells, length 5.2, diam. 4.2 mm., it is quite noticeably narrower. In one shell of this lot (Plate XLI*b*, fig. 4) there is a wide, lunate, concave umbilical area, defined by an acute black keel, the columella being wide, as in *P. ribeirensis*. It measures, length 4.2, diam. 4 mm. Further material is needed to show the status of this form, which for the present may be considered a race of *P. ribeirensis*.

### POTAMOLITHUS CATHARINÆ sp. nov.

The shell is perforate, acutely ovate, solid but strong, covered with an olive-green cuticle. The spire is conic, its lateral outlines straight, the apex small, but somewhat obtuse, entire in adult shells. Whorls 5½, evenly convex, parted by an impressed suture, which descends very briefly at the aperture. The last whorl is strongly convex throughout; near the aperture it dilates a little. The aperture is slightly oblique, ovate, fleshy-gray within, blue-white near the lip. The outer lip is thin and black at the edge, and with the basal lip forms a half-circle; in profile its edge is even. The columella is heavily calloused, the callus extending across the parietal wall, where it is less thickened. There is a distinct umbilical perforation and a feebly differentiated axial or columellar area, linear in the adult stage, but becoming wider in old shells.

Length 5.7, diam. 4.3, length of aperture 3.8 mm.

Colony of Hammonia, State of Santa Catharina, Brazil. Types, No. 103,048, A. N. S. Phila., from No. 163 of the Museu Paulista.

This is a much more robust species than *P. simplex*. It differs from *P. lapidum* by the produced spire and heavier columella. It is unlike all described forms in having a distinct umbilical perforation. The apex is perfect in all of the shells received, although the oldest of them has the last whorl deeply eroded.

(Fig. 16.)

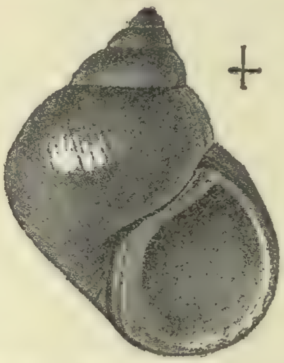


FIG. 16. *Potamolithus catharinæ.*

## GROUP OF P. LAPIDUM.

### POTAMOLITHUS LAPIDUM (d'Orbigny).

*Paludina lapidum* d'Orbigny, Magazin de Zoologie, p. 29 (1835).

*Paludestrina lapidum* d'Orbigny, Voyage dans l'Amér. Mérid., Mollusques, p. 382, pl. 47, f. 4–9.

*Hydrobia lapidum* Strobel, Materiali per una Malacostatica di terra e di acqua dolce dell' Argentinia Meridionale, 1874, p. 59, with var. *dunkeri*, t. c., p. 59, pl. 2, f. 5.

?*Hydrobia lapidum* d'Orb., E. von Martens, Malakozoologische Blätter, XV, 1868, p. 192 (Guahyba River at Porto Alegre; near Rödersberg; in the forest region and Cima da Serra at the *Estancia* of Christian Horn, on the plateau, 3–4000 ft. elevation; collected by Dr. Hensel).

?*Lithoglyphus lapidum* d'Orb., von Ihering, Malakozoologische Blätter (neue Folge), VII, 1885, pp. 96–99, figs. 1–3 (dentition, head and penis of specimens from the Santa Maria River, near its confluence with the Rio dos Sinos).

? *Lithoglyphus lapidum* d'Orb., Clessin, Malak. Blätter, n. F., X, p. 170 (Guahyba débris; Santa Maria River).

"Shell inflated-conic, short, thick, smooth, spire conic, acute at the summit; whorls 5, convex, the last whorl usually depressed, all being parted by a deep suture. Aperture round, ample, with thick borders, not reflexed. The columella is calloused. Color uniform green. Operculum corneous, flexible, spiral.

"Alt. 5, diam. 4 mm.

"This species is closely related to the preceding (*P. peristomatus*) by its short shape; it differs constantly by wanting a carina, and by the non-reflexed peristome" (d'Orbigny).

"*P. lapidum* inhabits the whole course of the Paraná and La Plata, from well above Corrientes to Buenos Aires, or from 27° to 34° S. lat.; on stones, clinging in great numbers to the under side, at extreme low water. It moves quite actively" (d'Orbigny).

The typical form of *P. lapidum*, figured by d'Orbigny, has an evenly rounded last whorl, though his phrase, "le dernier [tour] est souvent comme déprimé," indicates that the Paraná shells are frequently compressed around the upper part of the last whorl. Mr. E. R. Sykes, who kindly examined the types of the species for me, states that one specimen is so characterized. The aperture is ample, the lip not in the least contracted and not thickened, the columella only moderately thickened.

The variety *dunkeri* of Strobel, from the Rio de La Plata at Olivos, near Buenos Aires, seems to differ from *P. lapidum* only by its small size; length 4, diam. 3.5 mm., with 4 whorls. It was described from a single individual, and probably has no racial significance.

I have not seen typical *P. lapidum* from the Uruguay River.

In the State of Sao Paulo *P. lapidum* has been reported by several authors from streams flowing into the Atlantic, as quoted in the references above, which I am unable to control; but I doubt whether the true *P. lapidum* is found in those waters.

A form of *P. lapidum* having the spire rather longer than d'Orbigny's type figures is drawn in figs. 4, 5, 5*a* of Plate XXXIX. It is from the Uruguay River, exact locality not noted.

At Paysandú, Uruguay a race occurs differing somewhat from typical

*P. lapidum* (Plate XLI*b*, fig. 5). The shell is solid, globose, with conic spire longer than in *P. lapidum*, though the apex is eroded in all specimens seen. Aperture smaller than in *lapidum*, somewhat contracted by an internal thickening and contraction of the lip above. Columella narrow. A very narrow umbilical area is defined by an angle, which runs very close to the columellar lip. This race may be called var. *elatior*.

Length 4.5, diam. 3.5 mm.

The long spire separates this form at once from *P. paysanduanus*, which moreover differs in the shape of the last whorl. In old examples the aperture is more contracted than in that figured, and the spire is more worn.

### POTAMOLITHUS LAPIDUM SUPERSULCATUS Pilsbry.

(Plates XXXIX, Figs. 7, 7*a*; XLI*a*, Fig. 7.)

*Potamolithus lapidum supersulcatus*, Pilsbry, Nautilus, X, p. 88, Dec., 1896.

The shell is like *P. lapidum* in its globular shape. It is dark green, usually with pale, irregular zigzag markings, sometimes confined to the spire, and there is usually an indistinct brownish band above the periphery. On the last whorl an obtuse ridge revolves not far below the suture, most prominent on the back; this is followed by a concavity, below which there may be a second obtuse angle. The base is quite full and rounded. The suture descends suddenly to the aperture, which is therefore a little contracted, oblique and ovate. The peristome is acute, dark-edged, continuous, without trace of a varix. The columella is narrow and concave, and the parietal wall is only moderately thickened. Whorls 4½.

Length 5.3, diam. 4.7 mm.
" 4.3 " 4 "

Rio de La Plata, at San Gabriel's Island, near Colonia, Uruguay. Also Uruguay River at Fray Bentos, and Paysandú, Uruguay.

*Development.* — The spiral ridges appear only on the last whorl, and usually only on its last half. Up to that time the whorls are rounded and the shape Naticoid. At all stages of growth the columella is quite narrow.

*Potamolithus l. supersulcatus* is quite closely related to *P. tricostatus* (Brot), from which it differs chiefly by the weaker spiral ridges, which are only one or two in number, not three, as in *P. tricostatus*. These ridges are not only less emphatic in *supersulcatus*, but they do not appear so early in the development of the individual. The narrow columella is similar in the two species.

The specimens from Fray Bentos and Paysandú (where only a few were taken), have no second angle below the upper spiral ridge on the back. It is a very abundant snail at San Gabriel's Island. Specimens preserved in alcohol become brown when dried ; and this is also true of most, probably all, of the dark green species.

The figures by von Iterson, on Plate XXXIX, represent a very dark green specimen. They are not so characteristic as that on Plate XLI*a*, which shows the back of an example with the color-pattern fully developed.

### POTAMOLITHUS PARANENSIS sp. nov.

(Plate XLI*b*, Figs. 10, 11.)

The shell is globose, with conic spire, olive-yellowish, smooth except for fine growth-lines and very fine, indistinct spiral striæ. Whorls strongly convex, the last swollen below the suture, in its latter part flattened below the swelling, rounded at the periphery and base. The aperture is very oblique, ovate, outer lip thin and sharp. Columella moderately calloused.

Fig. 11. Alt. 3.3, diam. 3 mm.; 3 whorls remaining, the apex eroded.
" 10. " 2.4, " 2.3 " 4 whorls, the apex perfect.

Rio Paraná at Puerto Bertoni, Paraguay, collected by A. de W. Bertoni, No. 103,049, A. N. S. Phila., from No. 189, coll. Museu Paulista.

From the sharpness of the outer lip, I am disposed to think that none of the specimens is fully mature, though the largest one must be nearly so, as it is eroded like an old shell. It differs from *P. lapidum* by the longer spire, small size and pale color. There are two specimens in the collection of the Academy of Natural Sciences of Philadelphia, three in that of the Museu Paulista.

### POTAMOLITHUS DOERINGI sp. nov.

The shell is subglobular with a short conic spire, solid and strong, olive-colored, more or less streaked or mottled with black. The surface is dull, lightly marked with fine lines of growth and extremely weak, coarse spirals ; 3½ whorls of the spire remain, the apex being eroded in adult shells. The whorls are strongly convex, parted by a deep suture, which descends briefly at the aperture. The last whorl is convex throughout. Aperture quite oblique, large, white within. Peristome black, a little contracted, more so above, black. Columella and parietal wall moderately calloused, the edge black, continuous. There is a concave, crescent-shaped umbilical area defined by an angular ridge.

(Fig. 17.)

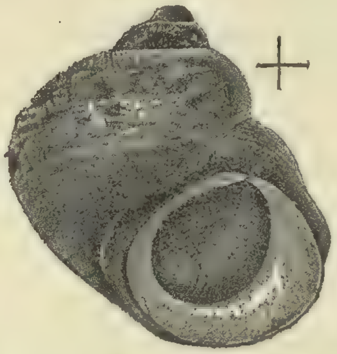


FIG. 17. *Potamolithus doeringi.*

Length 7, diam. 7 mm.; length of aperture with peristome 5.7 mm.

Salto do Yguassú, Province of Missiones, Argentina, collected by Dr. H. von Ihering, June, 1910.

This is a larger species than *P. lapidum* (d'Orb.), with the last whorl decidedly more dilated, the aperture more oblique, and a crescentic umbilical area developed. When collected, the shells were heavily coated with black ferrous material and most of them bear egg-capsules on the shell.

### POTAMOLITHUS PAYSANDUANUS von Ihering.

(Plate XLI*a*, Figs. 1, 1*a*.)

*Potamolithus paysanduanus* v. Ihering, Nautilus, XXIV, 1910, p. 15, with forms *sinulabris* and *impressus.*

The shell is imperforate, solid, subglobular, olive-colored, smooth except for weak growth-lines, shining. The spire is very low, conic, the apical whorls eroded in all the individuals seen; three whorls remaining are strongly convex. The last whorl is *swollen below the suture*, then somewhat flattened, rounded at the periphery and base. The suture descends abruptly to the aperture in fully adult shells. The aperture is somewhat oblique, ovate. The peristome is black, with obtuse, flat edge; the outer and basal margins are narrow; the upper part of the outer lip and the upper angle are wide, and the *columellar and parietal margins are very wide and flat, black*, contracting the aperture.

Length 4.8, diam. 3.9 mm.

Paysandú, Uruguay. Dr. Florentino Filippone. Types, No. 103,070, A. N. S. P.

This form differs from *P. lapidum* by its contracted aperture, the inner and upper margins of the peristome being heavily thickened within, the thickening covered with a blackish cuticle. In *P. lapidum* the aperture is ample, with no such heavy thickening. In the stage immediately preceding maturity the columella has a moderate white callus within, and the parietal callus is quite thin. The type specimen is figured. Six others I have seen show no significant variation.

With these specimens two other forms were sent which seem to be phases or varieties of the same species, but not intergrading in the material examined. Whether they occurred in the same or in separate colonies is not known.

Form SINULABRIS (Plate XLI*a*, figs. 2, 3). The shell differs from typical *P. paysanduanus* by having a low rounded ridge behind the outer lip, which is black, contracted, and has *a rounded sinus above.* The basal lip is narrow and a little retracted. The columellar and parietal margins are not so broad as in *paysanduanus.* There is an excavated umbilical area, but it is generally not distinctly defined by an angle. The shape is otherwise as in *P. paysanduanus.*

Length 4.5, diam. 4.9 mm.
" 4 " 4 "

Form IMPRESSUS (Pl. XLI*a*, figs. 4, 4*a*). The shell resembles typical *paysanduanus* as far as the middle of the last whorl, after which it has an impressed, concave zone a short distance below the suture, and usually a sinus in the upper part of the lip. The outer lip is thin and sharp, with no external varix or swelling. The shell, under the cuticle, is light yellow.

Length 5, diam. 4.8 mm.

Up to the time of reaching the size of adult *P. paysanduanus*, this form grows normally. After that, instead of forming a contracted aperture, it adds a half whorl, which is distorted by a superior concave zone and finally terminates with a thin outer lip. The specimens were sent with typical *paysanduanus.*

### POTAMOLITHUS QUADRATUS Pilsbry & von Ihering, sp. nov.

(Plate XLI*a*, Figs. 6, 6*a*.)

The shell is solid, imperforate, light olivaceous-brown, lightly marked with growth-lines, shining. The spire is very short, 3½ whorls remaining, the apex being eroded. The penultimate whorl has a strong angle at its upper third, is flat and horizontal above the angle, flat and sloping below it. The last whorl is bicarinate, the peripheral and shoulder carinæ being about equally strong, giving it a square appearance. The base tapers to a rather high ridge, which bounds a wide, excavated, umbilical area. The peripheral angle becomes obsolete just behind the outer lip, and it is visible only on the last whorl. The aperture is very oblique, ovate, white within. Peristome a little contracted, its face flat and thickened within, at and above the periphery and in the upper angle; below the periphery it is thin and a little retracted. The columella and parietal wall are moderately calloused, a groove in the face running parallel to their outer margin.

Length 3.9, diam. 4 mm.

Paysandú, Uruguay. Dr. Fl. Filippone.

This snail differs from *P. carinifer* in the shape of the last whorl, the much stronger upper keel (which is developed earlier) and in having a large umbilical area. It lacks the median keel and variegated coloration of *P. tricostatus*.

A young shell 2.4 mm. diam. consists of 2½ whorls, the first 1½ are rounded; the keel at the shoulder then begins, rapidly becoming strong. The columella is very wide, its face excavated.

### POTAMOLITHUS CARINIFER sp. nov.

(Plate XLI*a*, Figs. 5, 5*a*.)

The shell is imperforate, trochiform, solid, blackish-brown in old individuals, the shell of a brick-red tint below the cuticle. Surface lightly marked with growth-lines. The spire is very short, conoidal. Whorls about 4, the earlier ones convex. The first half of the penultimate whorl is convex; then a small carina gradually arises a short distance below the suture, the surface flat and sloping below it; a little later a strongly projecting keel appears just above the lower suture, being uncovered by the descent of the last whorl. The last whorl has a strongly projecting peripheral keel and a small keel near the suture, the surface flat between the keels. The base is a little convex. The umbilical area is slightly excavated, but not bounded by a ridge or keel. The suture descends slowly in its last third of a whorl, and then rapidly at the aperture. The aperture is very oblique, shortly ovate, flesh-tinted inside. Peristome blunt, not expanded. Columella concave, rather narrow, its face slightly grooved. Parietal wall rather heavy-calloused.

Length 4.2, diam. 4.1 mm.

Paysandú, Uruguay. Dr. Florentino Filippone.

This species closely resembles *P. microthauma*, from which it differs by the entire absence of a varix behind the outer lip; the coloration is also different, but the type is probably abnormally dark, being an old shell which has lost part of the cuticle.

### POTAMOLITHUS TRICOSTATUS (Brot).

(Plate XL, Figs. 6, *6a*, *6b*, 7.)

*Lithoglyphus tricostatus* Brot, Journal de Conchyl., XV, 1867, p. 68, pl. 1, fig. 4 (Uruguay River, Province of Entrerios).

The shell is trochiform, solid and strong; olive-colored, profusely marked with irregular or zigzag buff spots. The surface is glossy when clean, with the usual weak growth-lines and minute spiral striæ. Spire short, convexly conoidal. Whorls 4½, the first three convex. A ridge then gradually appears below the suture, increasing to a strong carina on the back of the last whorl. The last whorl has also a thick, strong keel defining the base, and a short keel, chiefly dorsal, above the middle of the slightly convex surface between the two keels. The base is flattened, but a little convex; a small columellar area is usually distinctly differentiated. The last whorl expands slightly at its termination, and then contracts. The aperture is very oblique, rounded-ovate, bluish-white within. The peristome is continuous, black-edged. The columella is narrow and concave; and, with the parietal wall, is moderately calloused.

| | | | | |
|---|---|---|---|---|
| Length | 5, | diam. | 5 | mm. |
| " | 5.3 | " | 4.8 | " |
| " | 4.7 | " | 3.9 | " |

Uruguay River, at Paysandú, Uruguay.

*Development.*—The youngest shells seen have nearly 4 whorls. The upper and lower keels are already strongly developed near the lip, but there is no trace of the intermediate keel, which in adults is less than one whorl long. The two keels present are very weak at the beginning of the fourth whorl, the basal one stronger there than the upper, so that apparently at 2½ whorls the form must be Naticoid, like *P. lapidum*. The next stage, at about 3 whorls, would have a basal angle only, like *P. buschii*. The columella is narrow, as in *P. lapidum*, throughout the neanic stage. The ephebic stage is marked by a slight expansion, forming a narrow and low varix. Fully adult shells are markedly gerontic by reason of the strong post-variceal contraction.

The figures of this species given by Brot are unsatisfactory from being too small properly to show its characters. The median keel is shown too low in position. The original locality was indefinite, but comprised an area including the river in the neighborhood of Paysandú. Three specimens of the original lot, received from Dr. Brot, agree with those collected by Dr. Rush at Paysandú.

### POTAMOLITHUS HATCHERI sp. nov.

(Plate XXXVIII, Figs. 6, 6*a*.)

The shell is imperforate, turbinate, solid and strong, pale yellowish-green, becoming darker and narrowly streaked with dark green on the later half of the last whorl; on the penultimate whorl the color changes to rich reddish-brown, becoming darker towards the summit. Surface glossy, with faint growth-lines and fine, indistinct spiral striæ. Spire conic, high and rather slender, the apex lost in the type, a pit in its place. Three whorls remain, the first two of them evenly convex. The last fourth of the penultimate whorl is very obscurely biangular, the lower angle more distinct than the other. These angles are more pronounced on the face of the last whorl, and on its later half the upper angle rises into a strong keel, the surface above it concave; at the same time, the lower angle loses in prominence, and is quite lost behind the lip. An extremely weak spiral ridge is developed on the back below the suture. The base is rounded. The last third of a volution of the suture descends more rapidly. There is no trace of a varix at the lip. The aperture is quite oblique, as wide as high, almost circular, but slightly angular above. The lip is obtuse, thickened within, with a continuous blackish marginal line. The columella is very concave, and not wider than the outer lip, and is bounded outside by a linear, hardly noticeable columellar area.

Length 5.5, diam. 4.9 mm.

Uruguay River, at Paysandú, Uruguay. Type, No. 90,218, A. N. S. P.

This species is based upon a single specimen, quite adult and to all appearance perfectly normal, yet so unlike other known species that its relationships are doubtful. The prominent characters of *P. hatcheri* are the elevated and tapering spire and the approximation of the two angles of the last whorl, the upper one finally dominating, while the lower becomes obsolete on the last half of the last whorl. The absence of a lip-varix and of a noticeable columellar area, as well as the rather narrow columella, are features like the *P. lapidum* group. The young shell, up to the middle of the penultimate whorl, must be ovate, without angles; but in the absence of immature specimens, not much can be said of the development of the species.

It is named to honor Mr. J. B. Hatcher.

## POTAMOLITHUS DINOCHILUS Pilsbry.

(Plate XXXVIII, Figs. 5, 7, *7a*, *7b*, 8.)

*Potamolithus dinochilus* Pilsbry, Nautilus, X, p. 87, Dec., 1896.

The shell is globosely trochoidal, imperforate, very solid and thick; green, profusely marked with irregular, zigzag buff streaks. The surface is smoothish, with the usual faint growth-lines and indistinct fine spiral striæ. The spire is conic, rather high when preserved entire (fig. 8), but worn to a blunt summit in all adult shells seen. There are 4½ whorls, but only 2½ to 3 remain in adults. The earlier whorls are rounded, but at the beginning of the last a small ridge arises a short distance below the suture. The last whorl is somewhat flattened and slopes steeply to the basal periphery, which is full and narrowly rounded or subangular. The ridge below the suture is narrow, but well developed on the back. The columellar area is ill-defined and very narrow. The lip is strengthened by a varix, which above the periphery is very high, massive and recurved, but becomes weak at the base. The aperture is very oblique, contracted, irregularly rounded, with the margins built out beyond the varix, continuous around the mouth, thick and obtuse. The columella is strongly concave, and moderately calloused, not more than the lip generally.

Length 4.9, diam. 5.2 mm.
" 4.5 " 5 "

Uruguay River, at Paysandú, Uruguay. Types, No. 69,695, A. N. S. P.

*Development.* — The series at hand contains no young shells, one only (Pl. 38, fig. 8) has not yet formed the post-variceal contraction. It appears however that, until the last whorl is reached, the shell has the primitive Naticoid shape. The last whorl represents morphologically the second neanic substage of such accelerated forms as *P. microthauma.* The strong post-variceal contraction and heavy thickening of the inner margin of the peristome declare that the last stage is distinctly gerontic.

*P. dinochilus* differs conspicuously from *P. microthauma*, *hidalgoi* and *peristomatus* by the absence of a peripheral keel, and from *P. orbignyi* by the shape of the last whorl and the ill-developed columellar area. It has perhaps more in common with the *P. lapidum* group, especially in the coloration and the persistence of the Naticoid form to the beginning of the last whorl; but the very high, massive lip-varix of *P. dinochilus* is a feature unlike any of the *lapidum* group.

### POTAMOLITHUS PERISTOMATUS (d'Orbigny).

*Paludina peristomata*, d'Orbigny, Magazin de Zoologie, p. 29, 1835.
*Paludestrina peristomata*, d'Orb., Voy. dans l'Amér. Mérid., Moll., p. 382, pl. 47, f. 1–3.

"The shell is short, trochoidal, thick, smooth, carinate in front, the carina projecting. Spire conic, short, obtuse at the summit, composed of 5 convex whorls, of which the last is keeled in front, the carina forming a border above the suture between the other whorls. Aperture round, much expanded, with thick, reflexed borders; the columella wide and flat. Operculum corneous, spiral. Color uniform greenish, paler in front of the mouth.

"Alt. 5, diam. 5 mm." (d'Orbigny).

Parduá River, above its confluence with the Paraguay River, at the villages of Itaty and Iribucua, Province of Corrientes, Argentina, at extreme low water, under stones where the current is strong; living in numerous families (d'Orbigny).

In general shape this species resembles *P. buschii* and *P. conicus*, but it differs from both by the well-expanded peristome. It is known by the original lot only.

### POTAMOLITHUS HIDALGOI Pilsbry.

(Plate XXXIX, Figs. 1, *1a*, *1b*.)

*Potamolithus hidalgoi* Pilsbry, Nautilus, X, p. 87, Dec., 1896.

The shell is imperforate, trochoidal, with flattened base and conic spire; moderately solid. The type specimen is dull reddish-brown, somewhat olive-tinted at the base, and olivaceous blackish on the lip-varix; but some immature shells of the original lot are dull olive-colored, darker on the keel. The surface is slightly marked with growth-lines. The spire is conic. There are 4½ whorls, the first 2½ convex; then a keel appears, immediately above and filling the suture. The last two-thirds of the last whorl descends slowly, the peripheral keel projecting above the suture. The last whorl is flat and slopes steeply above the peripheral keel, and is slightly convex below it. A very narrowly crescentic columellar area is defined by an inconspicuous, but acute angle. The outer lip is strengthened by a moderately strong varix, not continued below the termination of the peripheral keel. The aperture is extremely oblique, rounded-ovate, angular above and indistinctly so outwardly, at the termination of the keel. The columella is arcuate and moderately calloused.

Length 5.2, diam. 5 mm.

Uruguay River, at Paysandú, Uruguay. Types, No. 69,687, A. N. S. P.

A very weak ridge below and near the suture may be seen in two immature shells of the type-lot, but this is not developed in the others. The early neanic substage is Naticoid, like the corresponding age in *P. microthauma*. The rest of the neanic stage is the equivalent of substage 2 in *P. microthauma*. The deep descent of the last whorl gives a markedly gerontic character to the adult stage. *P. hidalgoi* is therefore less evolved sculpturally in wanting the third neanic substage, senile characteristics supervening earlier.

The species is named in honor of Dr. J. G. Hidalgo of Madrid, author of a beautiful work on the mollusks of the Spanish Commission to South America, among many other important labors.

### POTAMOLITHUS MICROTHAUMA Pilsbry.

(Plate XXXVIII, Figs. 2, *2a*, *2b*, 3.)

*Potamolithus microthauma* Pilsbry, Nautilus, X, p. 87, Dec., 1896.

The shell is imperforate, biconic, very solid and strong. The last whorl is olive-green, rather profusely marked with irregular buff maculæ, which are sometimes absent on the base. The lip-varix is bright green. On the penultimate whorl the ground-color changes to purple-brown and the markings disappear, the earlier whorls being uniform dark purple-brown. The surface shows delicate growth-striæ and a very minute, almost effaced spiral striation. The spire is conic, with straight outlines, the apex entire and obtuse, though small. Whorls 5, the early ones convex, the first 2¾ being rounded, without trace of keels. A peripheral keel then begins, strong from the beginning, and projecting flange-like above the suture. The last whorl descends slowly from about its last third and much more rapidly near the aperture. The peripheral keel projects very strongly and is slightly undulating; and a small keel arises below the suture, becomes stronger on the back, then gradually decreases. On the base, midway between the periphery and center, a low keel revolves, the area within it being nearly flat. There is a very narrow crescentic columellar area. The outer lip is strengthened by a very high and massive varix, which is recurved above, with a rib on its face running to the lip-edge, and below passes into the basal keel. The aperture is very oblique, ovate; the outer lip thin at the edge. The columella is narrowly calloused and regularly concave.

Length 5.5, diam. 6 mm.
" 4.6 " 4.7 "

Uruguay River, at Paysandú, Uruguay, under stones at low water, Types, No. 60,689, A. N. S. P.

*Development.* — The neanic stage is sharply divided into

(1) A *lapidum* substage, in which the shell is rounded, without keels. comprising the first 2¾ whorls.

(2) A carinate substage, initiated by the almost abrupt rise of the peripheral carina. From a half whorl to a whorl this is the only keel developed. This stage corresponds to the adult *P. hidalgoi*, and is of brief duration.

(3) The basal and the subsutural carinæ begin, weak at first, becoming stronger near the end of the substage.

The ephebic stage is announced by the expansion to form the varix, which, however, is not terminal, the whorl continuing and contracting beyond it, thus assuming gerontic characteristics.

*P. microthauma* is related to *P. hidalgoi* and *P. peristomatus*, but it is a much more evolved form than either, structures added in the second and third neanic substages of *microthauma* being superposed upon the adult structure of *P. hidalgoi.*

### GROUP OF P. IHERINGI.

### POTAMOLITHUS RUSHII Pilsbry.

(Plate XXXVIII, Figs. 1, 1*a*, 1*b*, 4.)

*Potamolithus rushii* Pilsbry, Nautilus, X, p. 89, Dec., 1896.

The shell is imperforate, wider than high, biconvex, very solid and strong; light green, the last half of the last whorl dusky green, the keels rather bright green; the early whorls being dark reddish-brown. The surface is somewhat glossy, with faint, fine growth-lines and barely perceptible spiral lines. The spire is convex, the apex obtuse. Whorls 4, but the first is eroded, leaving a pit, in all the adult shells seen. The whorls are convex, with seam-like sutures. In the latter part of the penultimate whorl the peripheral keel is usually visible at the suture. The last whorl has a very strong peripheral keel, the surface being concave above and below it. Above the concavity the upper surface is convex, the convexity rising into a hump on the back, then disappearing, the last fourth of the whorl being flat. The base has a thick and prominent keel, defining a concave yellowish columellar area. The outer lip has a high, narrow varix at the edge. The aperture is very oblique, short-ovate, nearly circular, with a continuous, black-edged margin. The oblique columella is very broad, with a gutter or concavity near to and parallel with the inner margin.

Length 4.3, diam. 6.3 mm.
" 5.1 " 6.3 "

Uruguay River, at Paysandú, Uruguay. Types, No. 69,686, A. N. S. P.

*Development.*—The youngest specimens seen have three whorls and a diameter of 3 mm. They have the depressed contour of adults and are strongly carinate peripherally, but the carina is distinctly weaker in front of the mouth, apparently indicating that it begins when the shell has nearly two whorls and a diameter of about a millimeter. At the 3 mm. stage the columella is very broad, semicircular, with a deep excavation and rod-like inner border (Pl. XXXVIII, fig. 4). Very late in the neanic stage the basal keel appears, the shell then being about 5 mm. in diameter; the columellar area being very narrow, at first linear. The rib or convexity of the upper surface is also of late appearance, these structures belonging to the third neanic substage, the second, or unicarinate, substage thus occupying the greater part of the neanic stage. The discontinuation of the upper ridge or hump initiates the ephebic substage. The marginal varix and the absence of any tendency of the last whorl to descend or loosen its coil anteriorly, show that this species is at its acme. It has none of the stigmata of senility which are so manifest in *P. microthauma*, *P. hidalgoi*, etc.

There is some variation in the degree of depression of the whole shell, the amplitude of the columellar area and in the prominence of the hump on the back, which is sometimes almost suppressed. The size also varies, one specimen before me with the varix nearly complete measuring only 5 mm. in diameter.

The relationship between *P. rushii* and *P. iheringi* is exceedingly interesting. The two species are similar in general color-scheme, in the varix, absence of more rapid descent of the suture towards the mouth, etc., but are totally diverse in contour, the one being carinate, the other smooth and Naticoid. Yet it is significant that while *P. iheringi* has no trace of a peripheral keel, the green band occupies the same position as that coloring the keel in *P. rushii*.

### POTAMOLITHUS IHERINGI Pilsbry.

(Plate XXXIX, Figs. 2, 2*a*.)

*Potamolithus iheringi* Pilsbry, Nautilus, X, p. 87, Dec., 1896.

The imperforate or rimate shell is globular-conic, very solid and strong, pale olive-yellow, with a sharply defined, bright green band bordering the suture below and another immediately above the periphery, visible as a narrow border on the penultimate whorl above the suture; the columellar area being also dull green. Very faint growth-lines and an almost effaced spiral striation are visible under the lens. The spire is low conoidal, the suture clearly incised but not impressed. Whorls 4½, the first half whorl usually lost in adult shells; the rest are slightly convex, the last whorl being globular, at first regularly rounded, but its last third descends slowly, and is perceptibly flattened obliquely in the peripheral region, being more full and convex below. The base is convex, but there is a concave crescentic columellar area defined by an inconspicuous angle. The outer lip is strengthened by a moderately strong varix, bevelled to the lip-edge, and weak at the base. The aperture is quite oblique, ovate, subangular above. The outer lip is thick within. The columellar margin is somewhat straightened, the columella very wide, flattened and excavated, a rather deep furrow running parallel with and near to the inner edge.

Length 5, diam. 4.9 mm.
" 4.9 " 4.6 "

Uruguay River, at Paysandú, Uruguay. Types, No. 69,698, A. N. S. P.

*Development.*—The youngest individuals seen have 3½ whorls, with a length of 2.3 and diam. of 2.8 mm. They are therefore more depressed than the adult stage, and have both green bands well developed. The subsutural green band begins at the end of the second or beginning of the third whorl. The axis is wholly imperforate. The columella is very broad, half-round, with the excavation in its face deeper than in adults. At no stage are there any traces of carinæ or protuberances.

I have seen a long series of this species. The characters described above are very uniform, and it is readily known by the Naticoid shape, grooved columella and green bands. Named in honor of Dr. H. von Ihering.

### POTAMOLITHUS PHILIPPIANUS sp. nov.

(Plate XLI*b*, Figs. 1, 1*a*, 2.)

The shell is globose, solid and strong, light greenish yellow, with a narrow dark green border below the suture, the apex pinkish. The surface is nearly smooth, showing faint growth-lines and fine, very indistinct spiral striæ. Spire low, conic, the apex minute, entire. Whorls 4½, convex, the last not more rapidly descending, distinctly flattened peripherally, shouldered above the flattened zone, very obtusely subangular below it, the base convex, with a rather wide, concave and crescentic columellar area, the lower portion of which is bounded by an angle. The outer lip is strengthened by a moderately high varix near the margin, much lower at the base, and continuous with the angle bounding the columellar area. The aperture is very oblique and semicircular, the outer margin being deeply arcuate, the inner somewhat straightened. The columella is rather broad, with a shallow furrow on its face; and the outer edge is somewhat elevated near the insertion, leaving, in the type specimen, a shallow crevice behind it, not visible in younger shells.

Length 5.7, diam. 5.7 mm.

Uruguay River, at Paysandú, Uruguay. Types, No. 103,050, A. N. S. P.

*Development.*—The smallest specimens seen measure 3 mm. diam., 2.8 high. The peripheral flattening is already weakly perceptible. There is no trace of a basal angle or columellar area, but the columella is very wide, almost semicircular, with a deep excavation in its face. The angle bounding the columellar area is developed very late, appearing only on the last whorl.

This species is described from four specimens, none of them perhaps completely mature. The shell figured is almost mature, but lacks the post-variceal contraction of the lip, which would probably be acquired. Two of the shells have a peripheral brown band, fading out at the edges, and one has a second fainter band on the outer part of the base.

Compared with *P. iheringi*, this species differs by its somewhat biangular shape, the lower varix and the coloration. *P. paysanduanus* differs more radically by its columella.

### LITHOCOCCUS gen. nov.

Shell globose, thick, sculptured with strongly developed spiral ribs, the upper ones spinose; composed of 4 to 5 convex whorls. Operculum corneous, subcircular, composed of 3 or 4 whorls, the nucleus near the center. Dentition Amnicoloid; central tooth with 5 to 7 denticles on the cusp and 3 basal denticles on each side. Inner lateral tooth with 13–14, next with about 16 denticles. Type *L. multicarinatus.*

This genus differs from the *Lithoglyphinæ* and *Potamolithus* by the operculum. The penis has not been examined.

LITHOCOCCUS MULTICARINATUS (Miller). *Lithoglyphus multicarinatus* Miller, Malakozoologische Blätter, n. F., I, p. 157, Taf. 15, f. 4. Rio Cayapas, Ecuador, abundant on rocks.

## PELECYPODA.

### Family *SPHÆRIIDÆ* Dall.

The family *Sphæriidæ* is represented in South America by four genera: *Sphærium*, *Musculium*, *Eupera* and *Pisidium*. Doubtless the last two genera will prove to be generally distributed and numerous in forms, *Eupera* in tropical, *Pisidium* in temperate and cold regions; but up to this time only a few have been described. The list of species described from south of the Equator, compiled in the course of work on Patagonian forms, is here given for the convenience of those who have occasion to study the group.

### LIST OF SOUTH AMERICAN SPHÆRIIDÆ.

SPHÆRIUM ÆQUATORIALE Clessin, Malakozoologische Blätter, n. F., I, 1879, p. 176, Taf. 11, figs. 4–6.

Rio Pedro, Val de Chillo, Ecuador. Length 9, alt. 6, diam. 3.5 mm. Referred by Clessin to the group *Corneola*.

MUSCULIUM ARGENTINUM (d'Orbigny). See below.

MUSCULIUM PATAGONICUM Pils. See below.

EUPERA BAHIENSIS (Spix), Testacea Brasil., 1827, p. 32, pl. 25, figs. 5, 6. *Sphærium bahiense* Spix, Prime, Monograph of American Corbiculidæ, 1865, p. 53, fig. 52.

Bahia, Brazil.

EUPERA MODIOLIFORMIS (Anton). *Sphærium modioliforme* Anton, Prime, Monograph American Corbiculidæ, 1865, p. 54. *Pisidium moquinianum* Bgt., 1855. *Pisidium diaphanum* Hald., 1841.

Venezuela, Brazil.

EUPERA TUMIDA (Clessin). *Limosina tumida* Clessin, Syst. Conchylien Cabinet, Cycladeen, p. 246, pl. 46, figs. 5–8.

Bahia, Brazil.

PISIDIUM MAGELLANICUM (Dall). *Corneocyclas magellanicus* Dall, Bull. Mus. Comp. Zool., vol. 43, October, 1908, p. 411.

Magellan Straits, in 61 fathoms; Rio Chico to base of the Andes.

PISIDIUM OBSERVATIONIS Pils. See below.

PISIDIUM PATAGONICUM Pils. See below.

PISIDIUM STERKIANUM Pils., Proc. Acad. Nat. Sci. Phila., 1897, p. 291, pl. 6, figs. 1–4.

Montevideo, Uruguay. Length 6, alt. 5, diam. 3.8 mm.

PISIDIUM DORBIGNYI Clessin, Conchylien Cabinet von Martini und Chemnitz, 2te Aufl., Cycladeen, 1879?, p. 62 (new name for *Cyclas pulchella* d'Orbigny, Voy. dans l'Amér. Mérid., Moll., p. 568, pl. 83, f. 8–10, not of Jenyns).

Maldonado, Uruguay. Length 3 mm.

PISIDIUM VILE Pilsbry, Proc. Acad. Nat. Sci. Phila., 1897, p. 292, pl. 6, figs. 17–20.

Montevideo, Uruguay. Length 2.6, alt. 2.4, diam. 2 mm. Near the following species, but shorter.

Pisidium globulus Clessin, Malakozoologische Blätter, n. F., X, 1888, p. 173.

Taguara, State of Rio Grande do Sul, Brazil. Length 3, alt. 2.5, diam. 2 mm.

Pisidium chiliense (d'Orbigny). *Cyclas chiliensis* d'Orb., Voy. dans l'Amér. Mérid., Moll., p. 568, pl. 83, figs. 11–13.

Concepcion, Chili. Length 5 mm.

Pisidium forbesii (Philippi). *Cyclas forbesii* Phil., Malakozoologische Blätter, XVI, 1869, p. 41. Pfeiffer, Novitates Conchologicæ, III, p. 489, pl. 105, figs. 15–17.

Bolivia alta (Forbes); Lake Titicaca (Raimondi). Length 7.5, alt. 6.5, diam. 4 mm.

Pisidium boliviense Sturany, Nachrichtsblatt d. deutschen Malakozoologischen Gesellschaft, 1900, pp. 56, 57, Taf. 1, figs. 1–7.

Bolivia, at Machacamac, between Chililaya and La Paz (Countess von Bayern).

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Length | 7.8, | alt. | 6.4, | diam. | 3.6 | mm. |
| " | 6.7 | " | 5.5 | " | 3.2 | " |
| " | 5.7 | " | 4.7 | " | 2.7 | " |

Near *P. forbesii*, but lower, more oval, with less projecting beak.

Pisidium lauricochæ (Philippi). *Cyclas lauricochæ* Phil., Malak. Blätter, XVI, 1869, p. 41. Pfeiffer, Novitates Conchologicæ, III, p. 489, pl. 105, figs. 12–14.

Lake Lauricocha, at head of the Marañon River. Length 7, alt. 6, diam. 4 mm.

Pisidium wolfii Clessin. *P. wolfii* Clessin in Miller, Malak. Blätter, n. F., I, 1879, p. 178, Taf. 11, figs. 7–9. Clessin, Conchylien Cabinet, Cycladeen, p. 268.

Rio Pedro, Val de Chillo, Ecuador. Length 5, alt. 4, diam. 2.5 mm. Very inequilateral.

Pisidium davisi (Bartsch). *Corneocyclas davisi* Bartsch, Proc. U. S. Nat. Mus., XXXIII, 1908, p. 681.

Chanchan River, Ecuador. Length 5, alt. 4, diam. 2.7 mm.

### MUSCULIUM PATAGONICUM sp. nov.

(Plates XLVI*a*, Fig. 8; XLVII, Figs. 1–7.)

The shell is thin, nearly equilateral, pale straw-yellow, glossy, finely striate. The beaks are low and broad, the embryonic stage marked off by a contraction or gutter. Anterior end almost symmetrically rounded; posterior end slightly flattened or subtruncate. Hinge-line arched. Cardinal teeth very minute, double in the right, single in the left valve. Lateral teeth very short, triangular, single in the left, double in the right valve.

| | | | | |
|---|---|---|---|---|
| Figs. 6, 6*a*. | Length 8, | alt. 6.6, | diam. 4.3 mm. | 35 miles above Sierra Oveja. |
| " 4, 5 | " 8.8 | " 6.8 | " 4.5 | " 25 " " " " |
| | " 9 | " 7.2 | " 5 | " 50 " " " " |

Springs and small streams along the Rio Chico de la Santa Cruz, from 15 to 50 miles above the Sierra Oveja. Types from 50 miles above the Sierra Oveja (Pl. XLVI*a*, fig. 8).

This species is closely related to *Musculium argentinum* (d'Orbigny), but constantly differs from that by having the posterior end less abruptly truncated, and the beaks flatter, not so full. Figs. 2, 3, 5 are not very good. Figs. 6, 6*a* and 7 show the shape better. Fig. 1 well shows the teeth as seen in a partly open shell. Eight lots are before me, from as many springs and streams, at distances of 15, 25, 30, 35 and 50 miles above the Sierra Oveja. The examples from farther up are the largest and are remarkably well developed in every way (Pl. XLVI*a*, fig. 8).

### MUSCULIUM ARGENTINUM (d'Orbigny).

(Plate XLVI*a*, Figs. 6, 7, 7*a*.)

*Cyclas argentina* d'Orbigny, Mag. de Zool., 1835, p. 44; Voy. dans l'Amér. Mérid., Mollusques, p. 568, pl. 83, figs. 5–7 (Montevideo).

*Sphœrium argentinum* d'Orb., Strobel, Mat. Malacostat. Argent., p. 77.

Not *Pisidium argentinum* Clessin, Conchyl. Cab., p. 63, fig. 2*a*.

D'Orbigny's figures of this species are very unsatisfactory. Clessin has, I believe, entirely misunderstood them. His *Pisidium argentinum* may possibly be *P. sterkianum* Pils. For the purpose of affording a basis for comparison with Argentine and Patagonian species, I figure two topotypes, an adult and a half-grown shell, collected by Dr. W. H. Rush, U.S.N., from a creek in the Prado, Montevideo.

The shell is fragile, olive-gray when full-grown, the young ones grayish, with a yellow zone at the basal edge. The ends are more abrupt than in *M. patagonicum*, and the beaks fuller. The teeth are decidedly more delicate and compressed than in *M. patagonicum.*

Pl. XLVI*a*, fig. 7, 7*a*. Length 9, alt. 7.8, diam. 5 mm.
" XLVI*a*, " 6. " 5.3 " 4.2 " 2.9 " (immature).

Strobel reports this species from San Carlos, Province of Mendoza, Bahia Blanca and Carmen de los Patagones. He gives the measurements, length 9, alt. 7.5, diam. 6 mm., for an example from the last named locality.

From the Rio Camaguan, Rio Grande do Sul, Dr. von Ihering sent a single specimen similar to *M. argentinum*, except in being shorter and more globose; length 7.9, alt. 7, diam. 5.2 mm. If such proportions characterize a race in that river, it will probably be considered as specifically distinct.

### Pisidium magellanicum (Dall).

(Plate XLVII, Figs. 12–16.)

*Corneocyclas magellanica* Dall, Bulletin of the Museum of Comparative Zoology, Vol. 43, October, 1908, p. 411.

"Shell small, whitish, with an olivaceous smooth periostracum, low, wide beaks and polished surface, with faint concentric indications of three or four resting stages; form inequilateral, anterior end shorter, bluntly subtruncate; base evenly rounded; posterior end slightly attenuated and rounded; external sculpture of faint incremental lines, chiefly obsolete between resting stages; interior smooth, white; hinge of right valve with a single feeble horizontal tooth directly under the beak, and two well-developed lateral teeth rather distant from the beak, the posterior lateral stronger. Length of shell 3.5, of posterior end of shell 1.8; height 2.5; diameter (of both valves) 2 mm." (Dall).

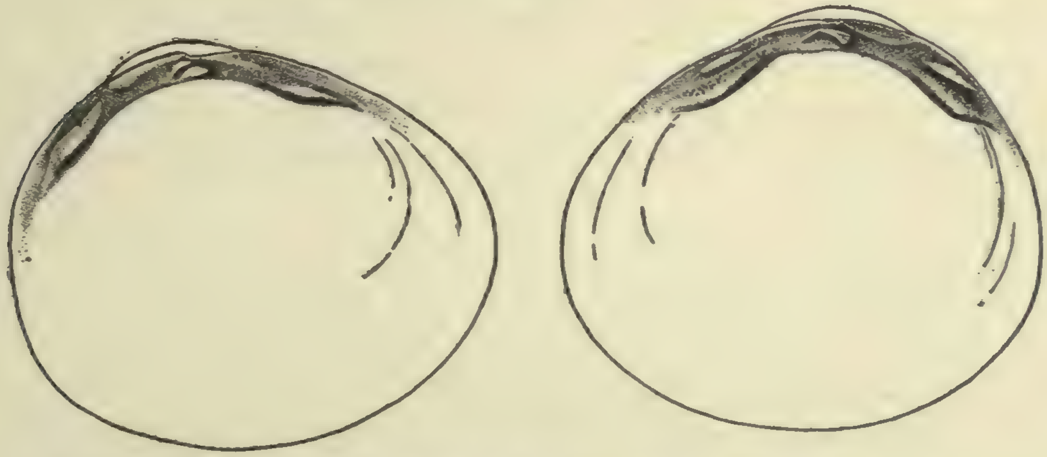
Magellan Straits in 61 fathoms, "Albatross" Station 2778. "A single right valve, evidently washed into the sea from some stream" (Dall).

Springs on the Rio Chico de Santa Cruz, fifteen (Pl. XLVII, figs. 15, 16) and twenty-five miles above the Sierra Oveja; Rio Blanco, at base of the Andes; springs near base of the Andes, 65 miles north of the Rio Chico, 2400 ft. elevation (Pl. XLVII, figs. 12–14).

Dr. Dall, who kindly compared specimens from the last locality mentioned above with the type of *P. magellanicum*, states that they agree almost exactly and, in his judgment, are the same species.

In the fresh specimens from 65 miles north of the Rio Chico the right valve has below the beak a horizontal arcuate tooth, with a straight oblique tooth above it nearer the anterior (short) end. The laterals appear to be smooth. The left valve has a rather long slender tooth, lower and angulated in the middle, the anterior ramus stouter and longer than the posterior. The lateral teeth arise under the visible part of the umbones (while in *P. patagonicum* they arise beyond it). They are high and triangular in profile (fig. 16). The shells are light olive externally, with several darker concentric streaks. The largest shells measure, length 4.9, alt. 4, diam. 2.7 mm.

FIG. 18.



*P. magellanicum*, 65 miles above Rio Chico. Interior of right and left valves.

Specimen from a spring 25 miles above the Sierra Oveja are similar, except that the lower cardinal tooth of the right valve is stouter. One opened contained eleven young ones about 1.6 mm. long, almost filling the cavity.

The teeth are practically identical in specimens from six lots examined.

## PISIDIUM PATAGONICUM sp. nov.

(Plate XLVII, Figs. 8–10.)

The shell is pale buff, glossy, very finely striate, with low, wide, smooth and glossy beaks; strongly inequilateral, the anterior end very short and rounded, base evenly convex, posterior end narrow and somewhat produced. Interior white. Cardinal teeth are excessively weak and low, nearly effaced. There is a very low, horizontal, rudimentary tooth in the right valve, a low short one in the left, with the scarcely discernible trace of another anterior to it. These teeth, especially the anterior one, are too distinctly defined in fig. 10. Lateral teeth very short and moderately strong, distant from the beaks.

Length 4.9, alt. 4.3, diam. 3 mm.

Springs on the Rio Chico, fifteen miles (type loc.) and thirty miles above the Sierra Oveja; twenty-five miles below the Rio Belgrano; and in the Arroyo Eke, near the head waters of Spring Creek, 2400 ft. elevation.

This clam differs from *P. magellanicum* by the shorter anterior end, short lateral teeth remote from the cardinals, the anterior laterals standing at an angle approaching 100° with the posterior laterals, on account of the curvature of the anterior margin. In *P. magellanicum* the angle of divergence of the teeth is decidedly greater, and they are longer. The cardinal teeth are almost obsolete in *P. patagonicum*, not projecting above the level of the hinge.

In the type lot, as well as in all the specimens from springs recorded above, the surface is straw-yellow and the striation fine and even, without periodic lines indicating growth-arrest. In specimens from small streams in the same region the shell attains a greater size, up to length 6.9, alt. 5.8 mm., and is marked externally with several darker concentric streaks, indicating periods of growth-arrest; the color is generally paler. This form, which may be called var. *zonifer*, is figured on Plate XLVI*a*, fig. 9. It is from small streams on the Rio Chico fifteen and twenty-five miles above the Sierra Oveja.

### PISIDIUM OBSERVATIONIS sp. nov.

(Text fig. 19.)

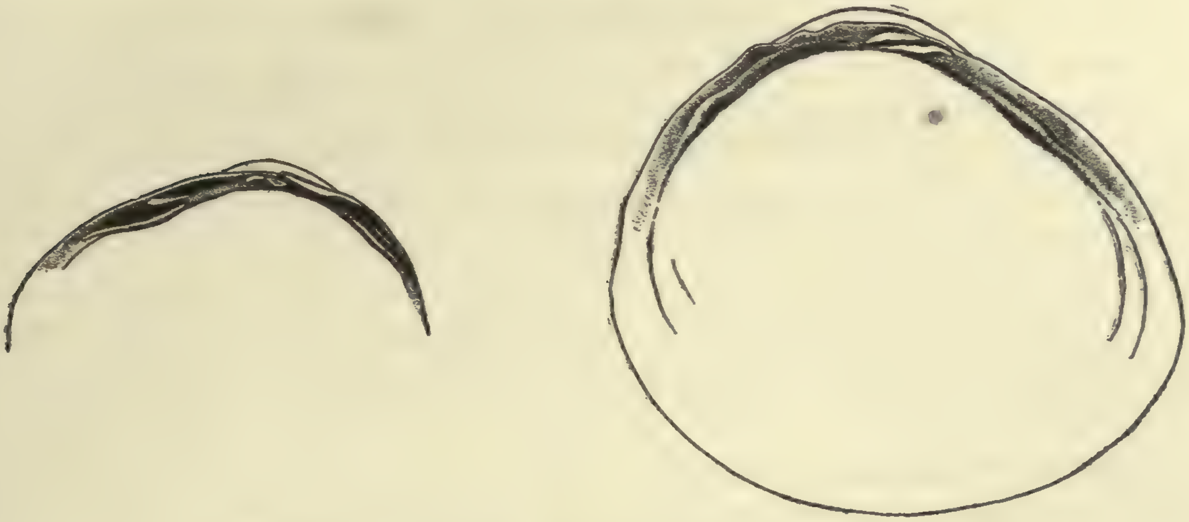
The shell is inequilateral, the beaks low and wide, anterior end very short, broadly rounded, posterior end narrow, rounded. Surface glossy, olive, drab or yellowish, marked with several impressed and darker resting periods. Interior bluish-white. Cardinal teeth: in the right valve there are two narrow teeth, parallel, oblique and contiguous. In the left valve there is one nearly straight horizontal tooth, lower and thinner near the middle. The lateral teeth are rather long and not remote from the beaks, single in the right, double in the left valve. The interlocking surfaces of these teeth are more or less granulous.

Length 4.8, alt. 4, diam. 3 mm.; sometimes larger, length 5.1 mm.

Near the Mount of Observation (below the mouth of Santa Cruz River).

This species is chiefly distinguished by its cardinal teeth, which differ constantly from those of the other Patagonian Pisidia.

FIG. 19.



*Pisidium observationis.* Interior of right and left valves.

## Family *MUTELIDÆ.*

### Genus ANODONTITES Bruguière.

*Anodontites* Brug., Journ. d'Hist. Nat. Paris, I, 1792, p. 131 (for *A. crispatus* Brug.).

*Patularia* Swainson, Malacology, 1840, pp. 287, 381 (for *P. ovata* Swains. = *trapesialis* Lam. and *P. rotundatus* Swains. = ? *Anodonta woodiana* Lea).

*Glabaris* Gray, Proc. Zool. Soc. Lond., 1847, p. 197 (for *Anodonta exotica* Lam.).

*Glabaris* Simpson, Synopsis of the Naiades, p. 916.

*Patularia* Dall, Nautilus, XX, 1906, p. 39 (type *P. ovata* Swains. implied).

### ANODONTITES PUELCHANUS (d'Orbigny).

*Anodonta puelchana* d'Orb., Mag. de Zool., 1835, p. 40; Voy. dans l'Amér. Mérid., Moll., p. 620, pl. 79, figs. 7–9. Doering, Informe Oficial de la Comision Científica de la Expedition al Rio Negro (Patagonia), 1881, Zoologia, p. 74.

Rio Negro: Marsh of San Xavier (d'Orbigny); 12 leagues from Chichinal (Roca Exped.).

### Genus DIPLODON Spix.

### DIPLODON PATAGONICUS (d'Orbigny).

*Unio patagonica* d'Orb., Voyage dans l'Amér. Mérid., p. 610, pl. 70, figs. 1–4.

Rio Negro.

### DIPLODON FRENZELLII (Ihering).

*Unio frenzellii* v. Iher., Archiv für Naturgeschichte, 1893, p. 3, pl. 4, fig. 12.

Rio Negro.

It may be well here to correct the nomenclature of an allied genus of the La Plata and Amazon basins, formerly known as *Castalia* Lam., 1819. This name was believed to be preoccupied by Savigny, in *Vermes*, and *Tetraplodon* Spix, 1827, has been substituted for it.

The late Professor Eduard von Martens wrote to me under date of 18 Oct., 1893, as follows: "Concerning *Castalia*, the date of Savigny's genus of Annelids is given as 1817 in Agassiz's 'Nomenclator,' it is true, but I am not sure that this is correct. I find Savigny's genus first in his System of Annelids, which is said to have been published in 1820, whereas *Castalia* Lamarck was published in 1819, vol. V, part I, of Lamarck's first edition [of the *Animaux sans Vertèbres*].

"P. S. I have consulted in these days the original edition of L. Agassiz's Nomenclator and I find concerning *Castalia* the note:

"'*Castalia* Sav., Syst. annélid., 1817. Savigny Système des Annelides, présenté à l'Acad. des Sci. en 1817, publié en 1826.'

"It is true that there is also an edition of the same work, in folio, which makes part of the large 'Description de l'Egypte,' and to which in Engelmann's Bibliotheca Zoologica, vol. I, p. 581, the date 1820 is given. By general consense the date of publication and not the date of finishing a manuscript and presenting it to a learned body is accepted as fixing the priority. I come to the conclusion that *Castalia* Lam., 1819 can stand for the shell, and *Castalia* Sav. among the Annelids is to be changed."

## II.

# NOTES UPON THE CHARACTERISTICS AND ORIGIN OF THE NON-MARINE MOLLUSCAN FAUNA OF SOUTH AMERICA.[1]

In the following synopsis I have limited myself to a brief consideration of data derived solely from mollusks. This course is not due to any underestimation of the value of other groups in biogeographic work ; but rather because conclusions drawn from a group known to me at first hand have a certain value which would not attach to borrowed data. The classification used herein is that of the Manual of Conchology so far as the groups have been considered in that work.[2]

It must constantly be borne in mind by those comparing the distribution of non-marine mollusks with that of vertebrate groups, that not only has evolution proceeded more slowly in the former, but migrations have been slower. Thus, when a Pliocene communication was established between North and South America, there was a rapid and extensive invasion of both areas by mammals ; but the molluscan invasion was very much slower and never extended nearly so far. Land and fresh-water mollusks are restrained by conditions which affect mammals and birds far less, such as areas with little forest, unsuitable or very scanty rock on the surface, or short river systems, not well connected.

Any inquiry into the antecedents of a fauna leads to the question of where its component groups had their rise. The rarity of land and fresh-water shells as fossils, and the great antiquity of the family groups, renders this question very intricate. The origin of many groups is still quite unknown ; yet most of the larger families of land-snails, and a few of the fresh-water groups may be traced back with considerable certainty, if not to definite centers, at least to extensive areas of evolution.

The several origins of air-breathing gastropods from marine groups—from the Opisthobranch stock, the Rhipidoglossa and the Tænioglossa

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[1] For bibliography see H. von Ihering, Archhelenis und Archinotis, Leipzig, 1907. A. Ortmann, Princeton University Expeditions to Patagonia, IV. T. Arldt, Die Entwicklung der Kontinente, Leipzig, 1907 ; bibliography on pp. 622–631.

[2] The family groups of land snails almost all differ widely in contents and limits from those of Fischer's Manuel and other systematic works ; a fact of first importance in dealing with the distribution of the groups, and the relationships of faunas.

— reach far back in Palæozoic time. We have no data bearing upon either the time or place of these events.

I. We have first to do with a fauna composed mainly of the Orthurethrous land-snails[1] — forms which are structurally but a step removed from the aquatic pulmonates, and now forming an insignificant element in continental faunas, though still dominant in the islands of the central Pacific. The families *Valloniidæ*, *Enidæ*, *Pupillidæ*, *Partulidæ*, *Ferussacidæ*, *Amastridæ*, *Achatinellidæ* and *Tornatellinidæ* are remnants of this fauna, which was doubtless once nearly or quite world wide, and probably attained its acme in Palæozoic time. The Heterurethra (*Succineidæ*, etc.) doubtless existed in this early fauna, as well as the Aulacopoda (*Endodontidæ* are known from the Carboniferous), and the *Helicinidæ*. Of the fresh-water forms probably represented in this fauna, we may mention the ancestral stock of fresh-water pearly mussels, the *Cyrenacea*, the ancestral *Melanopsidæ* and *Melaniidæ*, and the *Lymnæidæ*. With the rise of the Sigmurethrous snails, the land-snails of this primitive fauna declined in all continental areas.

One of the most remarkable features of the South American fauna is the extreme scarcity of these primitive Orthurethrous land-snails. This group is represented only by a few *Pupillidæ* and *Ferussacidæ*, probably derived from Middle America in the Tertiary, and closely related to Antillean and Mexican species.

The origin and early differentiation of the Sigmurethrous land-snails is unknown. At the time of their appearance as fossils, in the late Cretaceous and Eocene, the modern families were already more or less clearly blocked out, so far as they are represented by known fossils. From the evidence at hand, derived from the distribution of the groups in the recent fauna, and as Cretaceous and Tertiary fossils, it appears that the evolution of these families had proceeded during Mesozoic time in two chief areas, for which we may use terms proposed in another connection by Dr. Theodore Gill.

II. *Cænogæic or northern fauna*, occupying old land areas in North America, Asia and Europe, — what is now the Holarctic and part of the Oriental realm, with part of the Neotropical (the Antillean-Central American continent). Leading families evolved on this area or areas follow;[2]

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[1] See Manual of Conchology, XX, Introduction.

[2] The groups of low type continued or derived from the preceding fauna are not included.

those which appear to have radiated from the Antillean Continent are indicated by the letter A.

*Unionidæ*,
*Pleuroceratidæ*,
*Viviparidæ*,
*Diplommatinidæ*,
*Cyclostomatidæ A*,
*Proserpinidæ A*,
*Lymnæinæ*,
*Helicidæ*,
*Clausiliidæ*,
*Megaspiridæ*,
*Urocoptidæ A*,
*Testacellidæ*,
*Zonitidæ*,[1]
*Limacidæ*,
*Arionidæ*,
*Philomycidæ*,
*Oleacinidæ A*.

III. *Eogæic or Southern fauna*, which occupied chiefly the Gondwana continent, including a large part of South America, tropical and south Africa, and stretching in a great arch, possibly at no time perfect, to peninsular India and Australia. Here were evolved the families:

*Mutelidæ*.
*Etheriidæ*.
*Ampullariidæ*.
*Chilinidæ*.
*Acavidæ*.
*Strophocheilidæ*.
*Bulimulidæ*.
*Achatinidæ*.
*Aperidæ*.
*Rhytididæ*.
*Streptaxidæ*.
*Circinariidæ*.
*Veronicellidæ*.

The South American fauna is largely made up of groups of typically Eogæic or Southern origin, but there are also northern forms, derived from Middle America ("Antillia"), and a few groups of ancient and unknown origin. These several elements are as follows.

## I. Primitive Group.

*Families of very Ancient and Unknown Origin and World-wide Distribution, and Isolated Autochthonous Families of Eogæic Origin.*

*Circinariidæ*. Northern South America and temperate North America.

*Bulimulidæ*. Autochthonous; formerly spread to Australasia and now invading North America.

*Strophocheilidæ*. Autochthonous.

*Endodontidæ*. World-wide, on all continents and islands.

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[1] Primitive *Zonitidæ* were probably evolved at a very early time, but the group attained its main development in the Cænogæic faunas.

*Succineidæ.* World-wide, on all continents and islands.
*Chilinidæ.* Autochthonous.
*Amnicolidæ.* On all continents.

The ancestral stocks of these families probably formed the earliest fauna of non-marine mollusks in South America. Some of the families are known, in other regions, to have been established in Palæozoic times; and it is likely that as early as that they were already found in South America. All of them are sharply isolated groups.

The *Circinariidæ* seem to have remote affinity to *Rhytididæ* and *Streptaxidæ* — both of which evolved in the southern hemisphere of the Old World. In North America this family is probably intrusive, being represented by a single genus also found in South America.

The *Strophocheilidæ* have relations — though not close — with a series of genera (*Acavidæ*) now found in south Africa, Madagascar, the Seychelles, Ceylon, Moluccas, Australia and Tasmania. The radiation of this scattered group from the Palæozoic Gondwana continent of Neumayr seems a reasonable, in fact the only tenable, hypothesis.

The *Bulimulidæ* have descended from the Holopod stock, probably also of Gondwana Land, since we have no evidence of any other ancestry.

*Endodontidæ* and *Succineidæ* are world-wide groups, even on the most remote islands. Their early presence in South America is therefore likely.

The *Chilinidæ* represent an isolated branch of the primitive Basommatophora. No scrap of evidence has been brought to light to show that they ever existed elsewhere than in South America; and at present we have every reason to believe that there they invaded fresh water from the sea.

The *Pectinidens* group of *Lymnæidæ* and the *Ancylidæ* are evidently traceable to some very early radiation. Adequate data upon the soft anatomy and relationships of the forms of the southern hemisphere do not now exist.

## II. The Archhelenic Group.

### *Families which for the Greater Part are Represented in the Tropical African Fauna by a far Greater Diversity of Forms than in the South American.*

The hypothesis of an Africo-Brazilian continent of Palæozoic and Mesozoic times, first sketched out on purely palæontological grounds, and ably advocated by Dr. von Ihering from the evidence of the fresh-water fauna, is essential to any rational explanation of the distribution of land and fresh-water mollusks.

The following South American groups are common to the tropical African radiation center. Terrestrial groups are marked with an asterisk (*).

* *Streptaxidæ* (fig. 21).
* *Achatinidæ* (fig. 20).
* *Veronicellidæ.*
*Planorbinæ* (South American *Planorbis* and *Plesiophysa* close to African *Planorbis* and *Isidora*).
*Ampullariidæ* (genera with corneous opercula, fig. 22).
*Melaniidæ* (nearest to African forms).
*Mutelidæ* (fig. 23).
*Etheriidæ* (fig. 24).
*Sphæriidæ*, of the genus *Eupera.*

Such of these groups as are represented in the West Indies and subtropical North America, have evidently, from their distribution, relationships and the greatly diminished number of genera and species, been derived from South America, rather than from some common source, such as Archhelenis. None of them are present as Mesozoic or Tertiary fossils in North America,[1] and nearly all of them are likewise absent from European deposits.

There is a good deal of evidence that most of the above groups arose in the eastern hemisphere and migrated westward, and little evidence or none that any of them moved in the opposite direction.

The *Streptaxidæ*, *Achatinidæ*, *Ampullariidæ*, *Melaniidæ* and *Mutelidæ* are far more diversified in Africa than in South America. It seems that several Gondwana subfamilies were not present in the fauna of Archhelenis, or at least did not extend so far west as to reach South America, though they must date back at least as far as some other subfamilies which are represented both in South America and Africa.

The primitive stock of fresh-water mussels seems to have early split into two phyla: the one, *Mutelidæ*, evolving in the south, on the Gondwana-Archhelenis continent, the other, *Unionidæ*, in the north, in North America and Asia. The occurrence of both families in the same waters is evidently due to migrations, which ensued after the families had become differentiated. The *Mutelidæ* attain their northernmost point in the Panuco River, in northeastern Mexico, where the family is represented by one species of the South American genus *Anodontites.*

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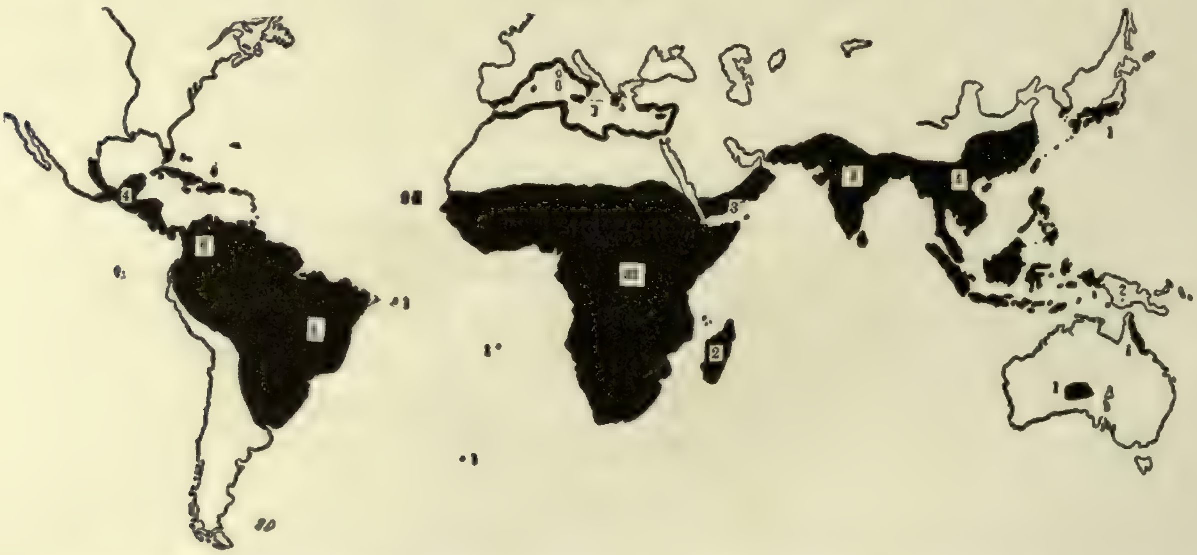
[1] The *Planorbinæ* are found on all continents, but those of South America are obviously most closely related to the African forms.

Simpson and Germain refer a few African forms to the South American genus *Diplodon,* and Germain has called attention to the similarity of the African *Pseudavicula* to the South American *Prisodon* or *Hyria.* If the resemblance of the shells proves to be supported by the soft anatomy, then this family at least will be evidence of an eastward migration in Archhelenis. At present the evidence is insufficient. The possibility of convergence in shell-form must be taken into account. Most if not all African *Unionidæ,* like the African *Cyclostomatidæ, Zonitidæ,* etc., are clearly of Oriental derivation. These are northern Cænogæic families which have invaded Africa during the Tertiary.

The maps following illustrate the distribution of part of the Archhelenic groups.

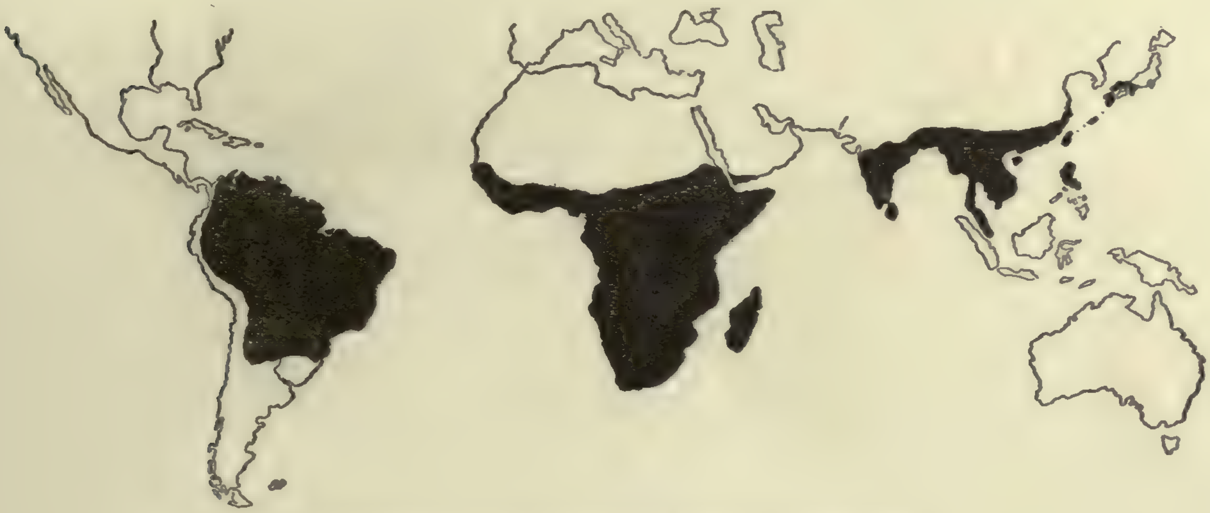
FIG. 20.



Distribution of the land-snail family *Achatinidæ.* The numerals represent the number of genera in each area.

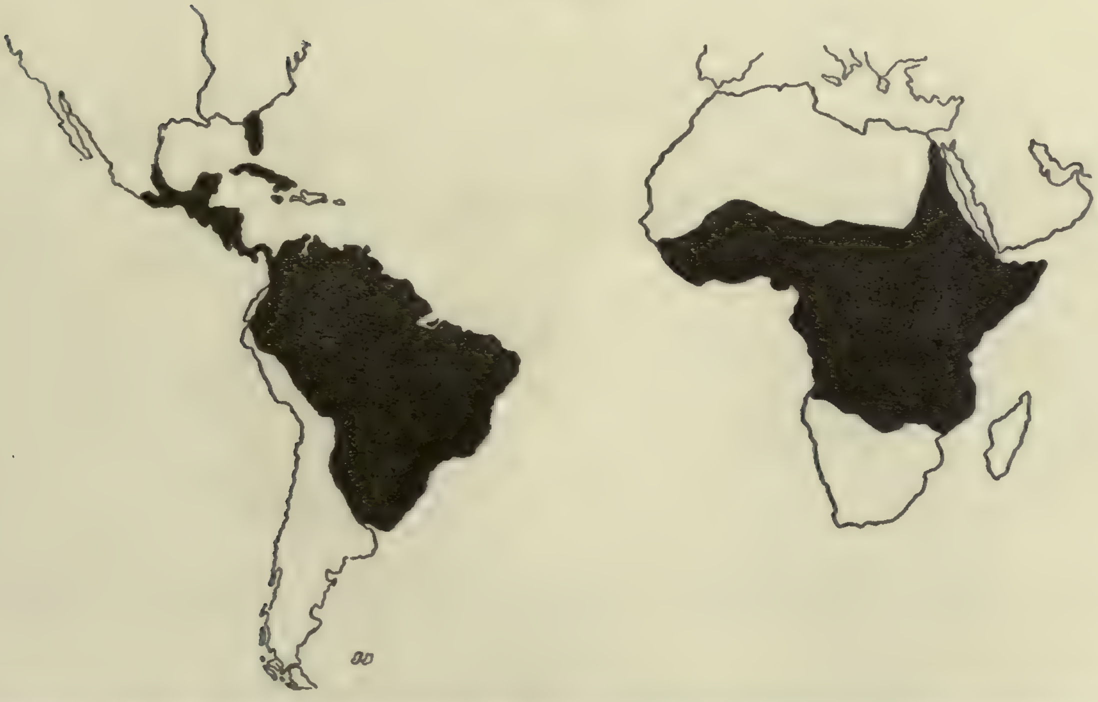
The autochthonous families, together with the Archhelenic group, make up the mollusk fauna of the Brazilian plateau; but the more isolated and peculiar, presumably older, genera have outlying forms in the Guiana-Colombian center, indicating a former unity of the northern and southern massifs. This connection of the Brazilian and Guiana-Colombian areas must have persisted long after the Archhelenic period, for distinctively American genera had been differentiated. It was interrupted prior to the union with the Antillean-Mexican continent, since the genera of that area

FIG. 21.



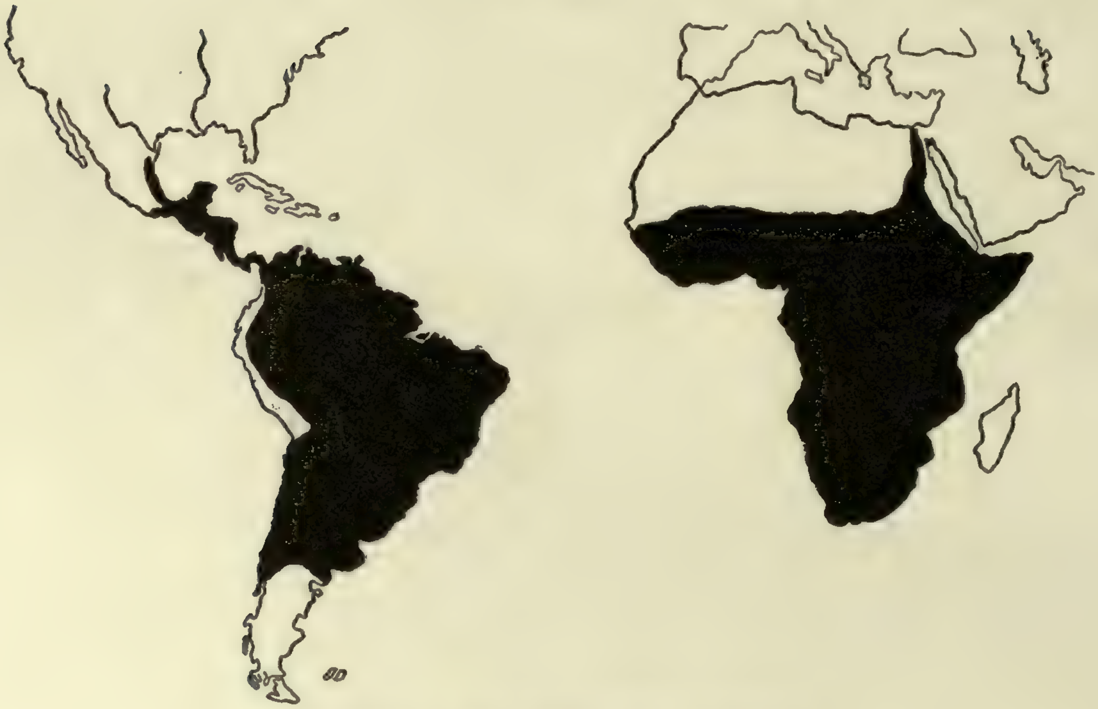
Distribution of the land-snail family *Streptaxidæ*.

FIG. 22.



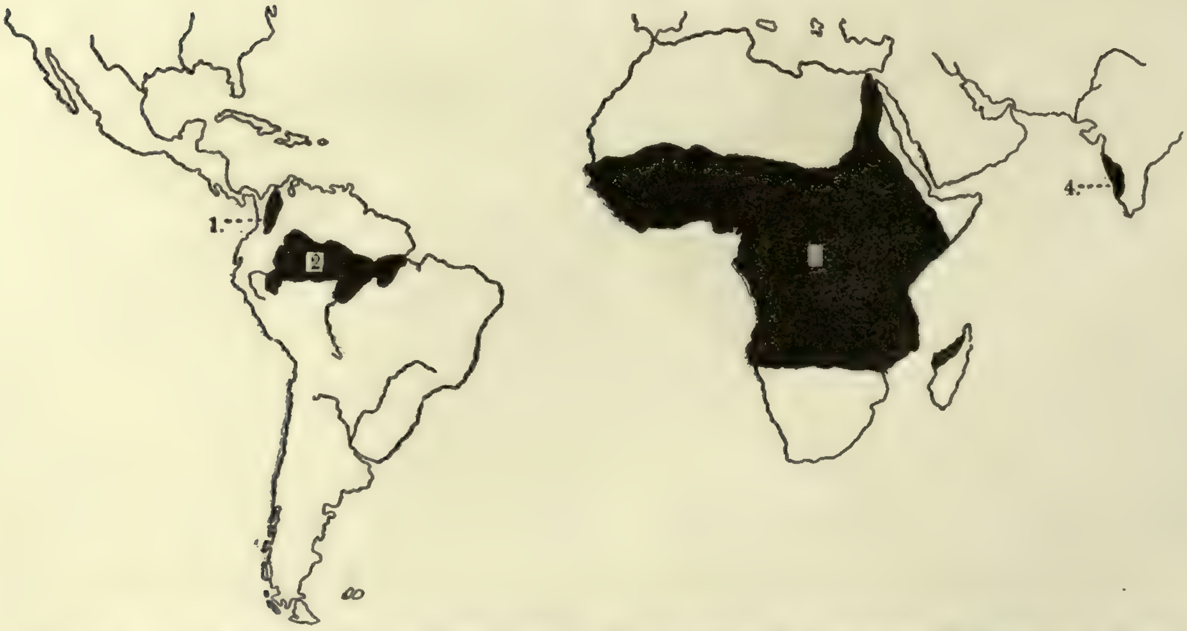
Distribution of fresh-water snails of the family *Ampullariidæ*, having the operculum wholly corneous.

FIG. 23.



Distribution of the bivalve family *Mutelidæ*.

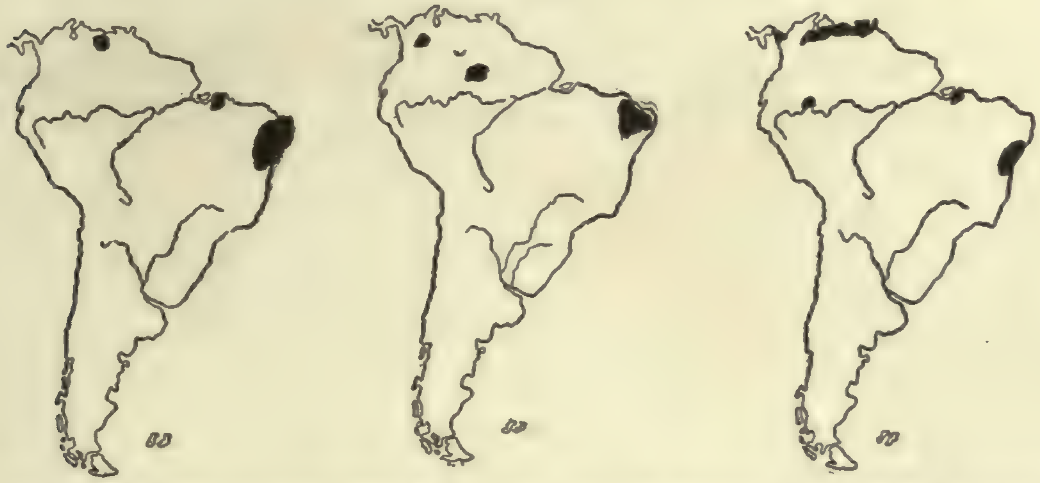
FIG. 24.



Distribution of the bivalve family *Etheriidæ*. 1, *Mülleria*; 2, *Bartlettia*; 3, *Etheria*; 4, *Pseudomülleria*.

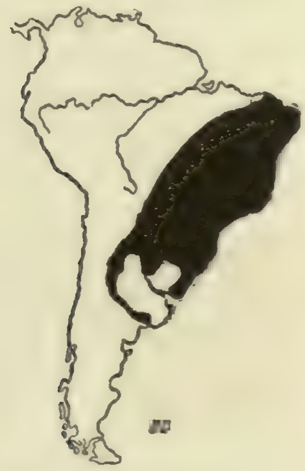
did not gain access to the eastern Brazilian plateau. If the conclusion that the Amazon valley was a Cretaceous bay or strait connecting the Atlantic and Pacific be well-founded, then the common dispersion center of this old fauna may have been in land now lost under the Atlantic. The facts of molluscan distribution favor the view that in Archhelenic times the Amazon valley formed a gulf *opening westward*, wherein Cretaceous deposits were laid down; eastern Brazil north to Guiana bounding this gulf on the east, until the depression of the Atlantic basin marked the close of Mesozoic

FIG. 25.



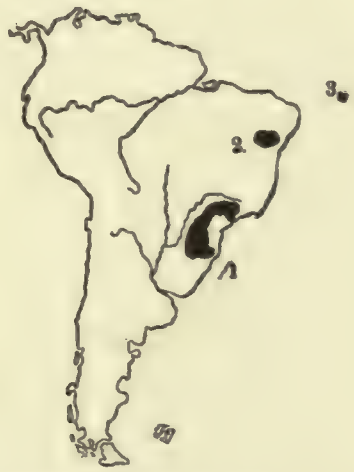
Distribution of *Tomigerus*, *Anostoma* and *Auris*, three old genera common to the Brazilian and Guiana-Colombian centers (probably all are more widely distributed inland).

FIG. 26.



Distribution of *Odontostomus*.

FIG. 27.



Distribution of (1) *Macrodontes*, (2) *Anctus*, (3) *Hyperaulax* and *Bonnanius*.

time. Such a hypothesis finds support in the presence of genera of the old Brazilian type on the island of Fernando Noronha. Numerous very peculiar land-shell genera, such as those tabulated in fig. 25, have a distribution not readily explicable on any other hypothesis; while in still other cases, allied but generically distinct groups are similarly distributed. It may be noted that Bates has remarked that the Para insect fauna is essentially Guianian.[1]

Figs. 26, 27 show the distribution of several old land-snail genera of the Brazilian center. Fig. 25 that of several genera common to the Brazilian and Guianian centers.

That the Amazonian valley ever formed an upper Cretaceous strait connecting the south Atlantic and Pacific, as claimed by Dr. Ortmann,[2] seems rather improbable.

The Guiana-Colombian elevation has been a secondary radiation center for a number of genera of autochthonous South American families, chiefly the *Bulimulidæ*. The arboreal groups *Oxystyla* and *Corona* have spread south of the Amazon into eastern Brazil (fig. 28), while numerous other genera from this center are restricted to the north and west as in fig. 29. The Guiana-Colombian area also served as a secondary center for Antillean and Mexican groups, entering by way of the Caribbean elevation and that in the Panamic region. These groups have spread southward as in figs. 30–34.

A hypothesis has been advanced by Dr. Ortmann[3] that Archhelenis of the Lower Cretaceous was succeeded in the Upper Cretaceous by a land bridge from tropical Africa to an area covering Guiana, the Caribbean Sea and the Mexico-Antillean region (the so-called Mesozonia), separated from the Brazilian island. By this hypothesis, Antillia should be as rich in African or Archhelenic types as Brazil, and in fact should show a closer resemblance to the African fauna due to the later connection. This is exactly contrary to the actual facts of molluscan distribution. All African or Archhelenic forms which exist in the Antilles are unequivocally of the South American type, and certainly indicate that there was no later migration or communication from Africa in the north. There seems little evidence for the Upper Cretaceous "Mesozonia," mapped by Dr. Ortmann, and there are very strong reasons for holding that no such land existed.

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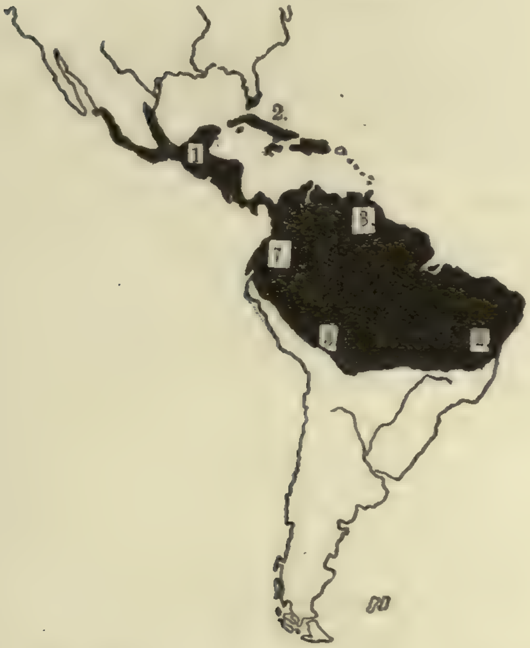
[1] Naturalist on the Amazons, I, p. 109.

[2] Proc. Amer. Philos. Soc., XLI, p. 381, and in later articles. Dr. Ortmann's palæogeographic maps incline strongly towards what Fiske would call the "wet theory." It is not likely that all beds reported as Upper Cretaceous were below the sea at any one time. To map an Upper Cretaceous epicontinental sea to include all the exposures of a formation which included so long a period of time is not warranted by our present slight knowledge of the stages of the South American Cretaceous.

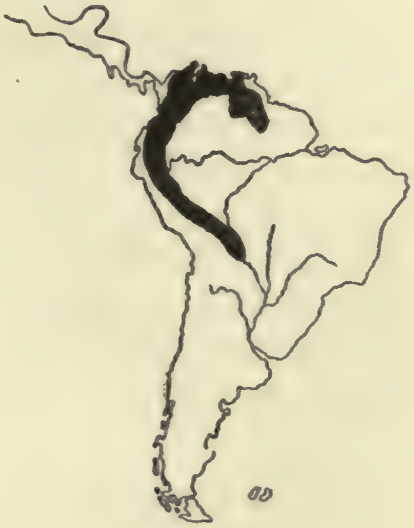
[3] The Geographic Distribution of Freshwater Decapods and its Bearing upon Ancient Geography. Proc. American Philosophical Society, 1902, pp. 380, 381.

FIG. 28.



Distribution of *Orthalicinæ*. *Oxystyla* spreads throughout the black area except in the Antilles. Number of genera in each district indicated by numerals.

FIG. 29.



Distribution of *Plekocheilus*, a genus of Guiana-Colombian origin, spreading southward in the late Tertiary.

Dr. von Ihering[1] holds that the subsidence of the Brazil-Ethiopian continent began in the north during the Cretaceous.

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[1] Archhelenis und Archinotis, p. 337.

## III.

### *Middle American (Mexico-Antillean) Forms, of Later Date in South America than the Archhelenic Group, in Some Cases Generically Differentiated from their Northern Ancestors, but more often Belonging to the Same Genera; Therefore Doubtless Traceable to both Earlier and Later Migrations Southward.*

*Helicidæ*[1] (figs. 31, 32).
*Urocoptidæ* (fig. 33).
*Oleacinidæ* (fig. 30).
*Pupillidæ.*
*Ferussacidæ.*
*Lymnæidæ* (of the *Galba* group).
*Physidæ.*
*Cyclophoridæ* (fig. 34).
*Cyclostomatidæ.*
*Proserpinidæ.*
*Helicinidæ.*

These intrusive forms from middle America are characteristic of the Guiana-Andean region, though a few have attained a wider distribution. Streams of migration from and to the Antilles are indicated by the way of the Caribbean Islands on the east, and on the west the region of the Isthmus of Panama, where the interchange of forms has continued to the present time. That the middle American elements are far younger in South America than the Archhelenic, is shown by their close relationships to Antillean and Mexican forms, very few special genera having evolved. In most of the families only one or very few genera have invaded South America out of a large number in the parent lands. Moreover, it is notable that they have not extended far south in the east, where the Amazon valley has proved a barrier to land-snails. Their distribution has been along the Andes, spreading eastward in Bolivia and southern Brazil.

---

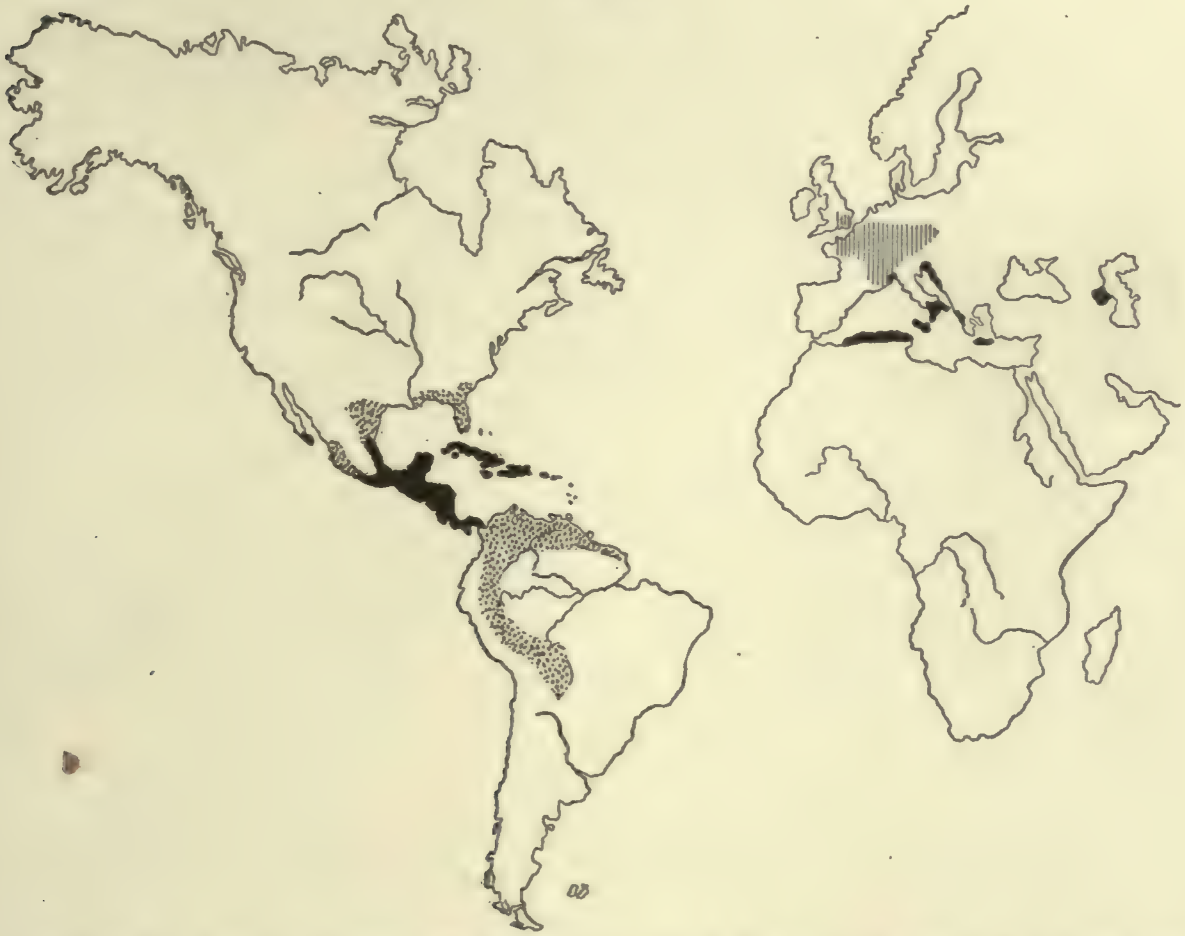
[1] The belogonous and epiphallogonous *Helicidæ* of South America are clearly of northern origin. Whether such extremely peculiar genera as *Solaropsis*, *Psadara* and *Macrocyclis* also belong in the same category, seems somewhat uncertain, although such competent malacologists as von Ihering and Fritz Wiegmann place these genera in the *Epiphallogona*.

The heavy, large Helices of the Eocene of southern Europe, such as *Deutellocaracolus*, *Prothelidomus*, *Galactocheilus* and *Fridolinia*, may perhaps belong to the group Epiphallogona of my arrangement, rather than to the Helicinæ where I formerly placed them; yet if so, I think the supposed relationship to West Indian forms is not especially close. Like the American and European species of *Adelopoma*, the Epiphallogona probably reached both Europe and America from eastern Asia, and from opposite directions.

Dr. von Ihering (Verhandlungen k. k. zoologisch-botanischen Gesellschaft in Wien, LIX, 1909, pp. 420–428) has recently referred the belogonous Helices (*Epiphragmophora*) of Argentina and southern Brazil to the European genus *Helicigona* (*Campylæa* auct.); but I do not believe that this classification can be sustained. So far as I know, the South American Epiphragmophoras have the spermathecal duct very short, whereas *Helicigona*, like all other European Belogona, has a *very long duct*, bearing a long diverticulum, which is bound by a membrane to the oviduct. These are important differences, quite sufficient to show that *Epiphragmophora* is not at all closely related to *Helicigona*, aside from the different shape of the mucous glands, and their removal in *Epiphragmophora* from the vagina, *upon which they are invariably inserted in all European Belogonous Helicidæ.*

By its short spermatheca, *Epiphragmophora* differs strongly from all other known belogonous *Helicidæ*. In other features it stands nearer to Antillean and North American forms than to European. My former treatment of the genus was too inclusive. I would now restrict *Epiphragmophora* to forms having the spermatheca short, removing all of the Mexican and North American species (which have a long spermathecal duct) from the genus.

FIG. 30.

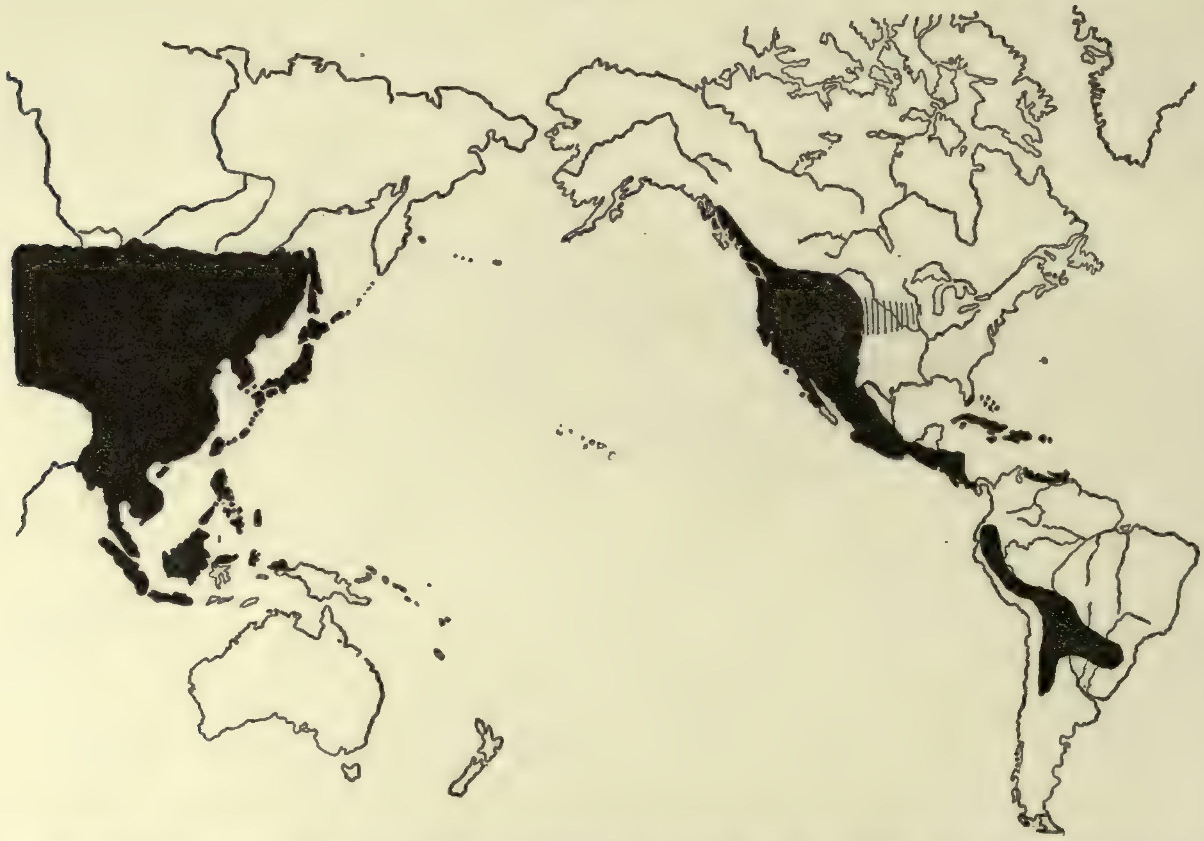


Distribution of the *Oleacinidæ*. The dotted area stands for the genus *Euglandina* only, which also occupies Mexico and Central America. Vertical shading in Europe for Tertiary, black for recent species of *Pöiretia.*

Figures 30 to 34 illustrate the distribution of middle American groups of land-snails incursive in South America.

In molluscan distribution, there is strong evidence against the view of Ortmann (1902, p. 347) that the northern margin of South America formed part of the Antillean continent. Schuchert's representation of the Caribbean Sea as an old permanent basin seems preferable; but his representation of the total submergence of the Antilles in the Middle Cretaceous and again in the Upper Oligocene[1] cannot, I think, be sustained. The rich Oligocene beds of Jamaica (Bowden) and Santo Domingo, carrying a marine fauna of littoral type, occur at very low levels; and no deposits actually known to be Oligocene are found on the higher mountains, which I believe were islands in both Cretaceous and Oligocene times.

FIG. 31.



Distribution of *Helicidæ* of the group Belogona Euadenia (one species extends westward to eastern Europe).

The primary region of radiation of the middle American families named above is a subject too large for adequate discussion in this place. So much is clear: the fauna contains three groups of diverse genesis. The autochthonous group, such as *Oleacinidæ*, *Urocoptidæ*, *Cerionidæ*, *Sagdinæ* *Cyclostomatidæ*, *Helicinidæ*, contains many phylogerontic lines, signalized by shells with more or less detached or uncoiled later whorls, sculptured embryonic whorls, highly developed, often spinose sculpture, complicated internal armature, and the like. These first families of Antillia, now in their old age, are related to the families of the northern or Cænogæic area of land-mollusk evolution. Some of them, and the ancestors of all, doubtless had a much wider range in Mesozoic times. A few, such as the *Oleacinidæ* and *Cyclostomatidæ*, were abundantly developed in Europe as late as the Miocene, or even linger in a few forms in the recent fauna. These European forms cannot, in my opinion, be looked upon as ancestral to the Antillean, but rather as parallel descendants of a common stock derived from the north, where the old Scandinavian and North American land areas were, at least from time to time, united.

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[1] Bull. Geol. Soc. Amer., XX, Pl. 95, 97, 1910.

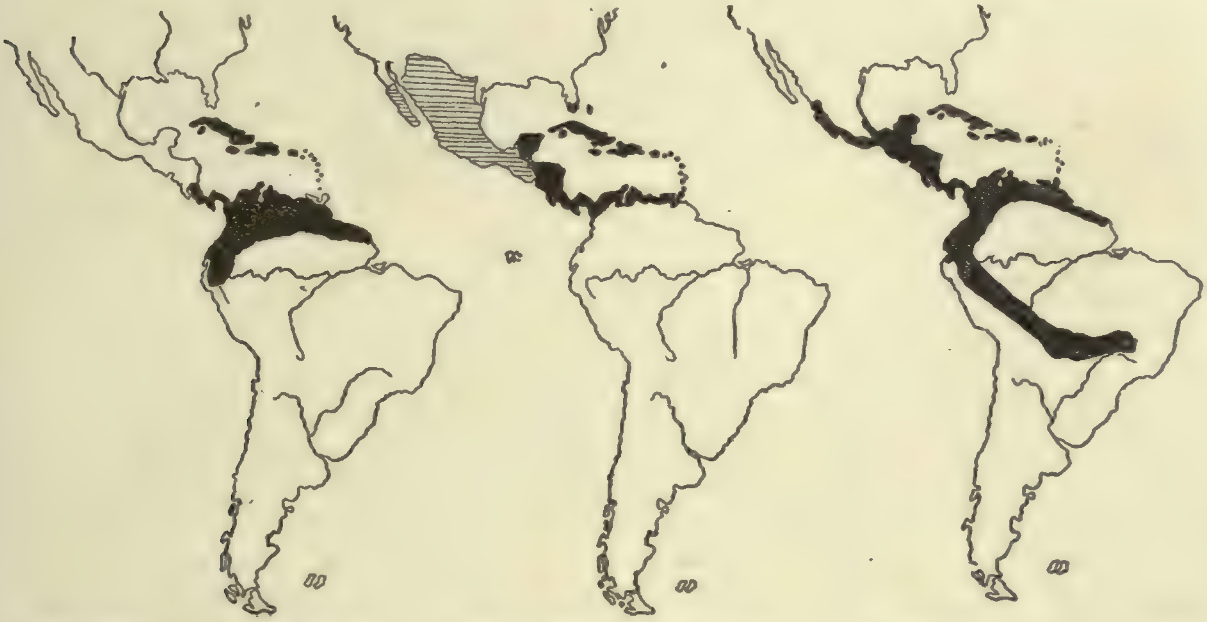

FIG. 32.

Distribution of Epiphallogonous Helices in America (exclusive of *Solaropsis* and *Macrocyclis*).

FIG. 33.

Distribution of Urocoptidæ. Shaded area *Eucalodiinæ* and *Holospirinæ;* black area *Urocoptinæ*.

FIG. 34.

Distribution of *Cyclophoridæ* in America.

A second element of the Mid-American lands consists of groups derived from the Chinese or east-Asiatic center. Prominent members are the dart-bearing and the Epiphallogonous *Helicidæ*, the *Cyclophoridæ*, *Dip-*

*lommatinidæ* (*Adelopoma*), *Clausiliidæ*, etc. These forms never have the old-age stigmata of the preceding group. They are developed in wonderful abundance and virility. Being known in characteristic genera of American type (*Pleurodonte*, *Cepolis*) in the Floridian Oligocene island, the advent of the group in middle America must have been much earlier. It could hardly have been later than the beginning of the Eocene, and probably was not later than the Upper Cretaceous.[1]

Finally, we have as the latest faunal element in the Antillean-Mexican area, a series of South American forms — *Achatinidæ*, *Bulimulidæ*, *Ampullariidæ*, *Melaniidæ*, *Mutelidæ* and some North American forms, *Unionidæ*, *Pupillidæ*, *Zonitidæ*, *Polygyrinæ*, etc. These are, with very few exceptions, unchanged generically, and some are specifically identical with existing South or North American forms. It is very evident that such Archhelenic forms as exist in the Antilles and Mexico were not derived directly from the Archhelenic area; they migrated in the later Tertiary and Pleistocene from the Guiana-Colombian center.

Antillia has not been an evolution center for fresh-water mollusks or fishes, evidently because it has never been a very large area, and has been an unstable one, at one time in form of a continent, again an archipelago, hence without river systems of great extent or duration, such as are essential to the evolution of a fresh-water fauna.

There is absolutely nothing in the distribution of mollusks suggesting that either South or North America was at any time connected with the supposed South Pacific continent, or the Hawaiian group. Even Juan Fernandez has a land-snail fauna of Pacific and not South American type. The Hawaiian and Polynesian connections with America mapped by Arldt (1907) seem quite impossible.

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[1] The American *Clausiliidæ* are thought by Professor Boettger to be related to the European Miocene and recent Pyrenean group *Laminifera*, but they seem to me even closer to the genus *Garnieria*, of the Indo-Chinese center. The *Helicinidæ* may have arisen in Middle America from an aquatic rhipidoglossate stock, but the very wide distribution of the group in Polynesia and eastern Asia suggests that it is a very old one, which probably appeared among the first land-snails.

The Belogonous Helices still exist in high latitudes on both sides of the Pacific, being known from Sitka on the American and the Kuril Islands on the Asiatic side.

## ARCHIPLATA AS AN EVOLUTION-CENTER.

Wallace in 1876[1] showed that the South American fauna is divisible into two subregions which he called the *Tropical* or *Brazilian* and the *South Temperate* or *Chilian*. He calls attention to the affinities of the Chilian diurnal Lepidoptera and the Carabidæ to North Temperate forms.[2] Dr. H. von Ihering in numerous papers[3] has recognized the two subregions of Wallace as distinct evolution centers. He concludes that these centers, Archiplata (that is, Patagonia, southern Brazil, Chili and western Peru) and Archibrazil, were long isolated from one another by an arm of the sea. As primitive elements of the Archiplatan fauna he mentions the fresh-water crab *Æglea*, the genus *Parastacus*, and the mollusks *Diplodon* and *Chilina*. Negative characteristics are found in the absence of the dominant Amazonian genera of mussels and *Ampullariidæ* (which seem to have invaded the La Plata drainage area comparatively lately, probably in the Pliocene) to which many groups of land-snails might be added.

The geology of the regions involved is so imperfectly known that we have no positive data for or against the hypothesis that an arm of the Cretaceous sea extended across the continent, as von Ihering claims. This is a question only to be settled by geological exploration of the region, which may perhaps show a Cretaceous transgression similar to that which involved eastern Mexico and the region northward in the middle Cretaceous. Yet the fact remains that, so far as molluscan groups are concerned, there is but little evidence of such an isolation of the Archiplatan area. The barriers to migration imposed by climate have not been taken into account. The *Ampullariidæ* are snails that have never, in any region, been able to extend beyond a subtropical climate. The *Chilinidæ* (fig. 36) are apparently, like the large Lymnæas in North America, snails which cannot exist in a subtropical or even a warm temperate environment, however favorable may be the conditions of migration. It is instructive, in this connection, to compare the Lymnæid faunas of Minnesota and Arkansas, which show great diversity, although favorably situated for migration.[1] Another group which is widely distributed in the Archiplatan area, though not confined to it, is the Amnicolid genus *Littoridina* (fig. 35). The absence of Amnicolidæ in the Amazon system is probably apparent rather than real, since practically no collecting of small or minute mollusks of any kind has been done in that vast area. It is likely that Amnicolidæ will be found there in abundance. *Diplodon*, another genus which Dr. von Ihering considers Archiplatan, is found almost all over the continent, and cannot fairly be claimed as of Archiplatan origin. It no doubt arose from the same Brazilian (and ultimately Archhelenic) stock as *Hyria*, etc.; but like *Unio* in the northern hemisphere, it is a hardy stock not highly evolved in its phylum, hence probably old. Compare in this connection the Unionid and Pleuroceratid fauna of Alabama with that of Georgia and the Carolinas. In these adjacent areas, which have been continuous land since very early times, we have as much difference in the fresh-water faunas as has been shown to exist between Archibrazil and Archiplata. Rich faunas of fresh-water mussels and gastropods are rarely found in regions like

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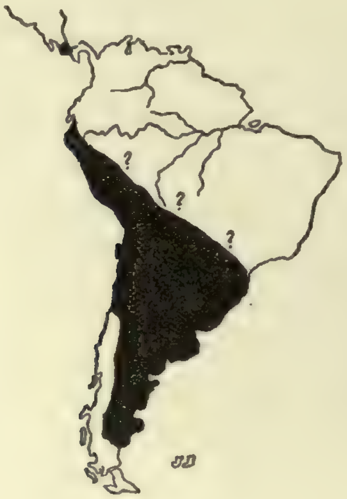
[1] Geographical Distribution of Animals, II, frontispiece and Chapter XIV.

[2] Dr. Scharff has suggested an explanation of this peculiarity (American Naturalist, September, 1909, p. 513), but his hypothesis explains only a few facts. It would involve us in problems more intricate than those which it solves. Possibly the systematic relations of the insects in question have not been rightly estimated.

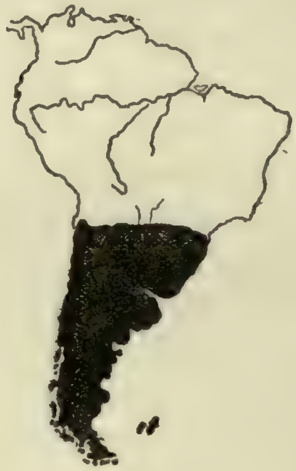
[3] The more important of these articles have been reprinted in his "Archhelenis und Archinotis," Leipzig, 1907.

Fig. 35.



Known distribution of *Littoridina*, a genus of fresh-water snails.

Fig. 36.



Known distribution of Chilinidæ, a family of fresh-water snails.

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[1] At Davenport, Iowa, I have found *Lymnæa stagnalis* on logs rafted down the river from Minnesota, but the species has not been able to gain a place in this fauna there or farther south ; nor have many of the other northern Lymnæidæ, which must yearly be brought down on drift wood during the spring floods.

southern South America, drained by numerous short, independent rivers, owing to the difficulty of migration and the relative impermanence of the individual streams.

The presence of peculiar and strongly individualized land snails of Brazilian type (*Scalarinella*, *Plagiodontes*, etc.) in the Sierras of western Argentina and the now isolated Sierra Ventana, shows that long ago the Brazilian fauna extended at least as far south as Bahia Blanca, where a fragment has persisted, isolated since the Pliocene at least.[1]

Taking into consideration the climate, the rarity of large forest areas, the aridity of large tracts, and the short, unconnected rivers, we are not inclined to give much weight to Dr. von Ihering's contention that many Brazilian groups are wanting in "Archiplata." So far as mollusks are concerned, that area has very slight claims to rank as an evolution center. I regard the Chilian and Patagonian fauna as an impoverished and slightly modified extension of the fauna of the old Brazilian continent. The evidence for an Archiplatan center may be stronger in the case of Crustacea, Oligochæta, plants and insects; but I prefer to leave the discussion of these groups to those having first-hand knowledge of them.

Connected with the Archiplata hypothesis is that of Antarctica, which may here be examined briefly.

## AUSTRAL ELEMENTS IN THE SOUTH AMERICAN FAUNA.

The Austral or Antarctic relationships of the South American fauna have been somewhat fully discussed in other volumes of this series, and a map illustrating the Antarctic continent and its hypothetical former extensions may be found in volume IV. I have to deal here with the *evidence afforded by the non-marine mollusks, which, taken by itself*, leads to the following conclusions: (1) There is no evidence that Antarctica was ever an evolution or radiation center for non-marine mollusks, though there is some evidence showing that it served as a highway for migration. (2) There is some evidence of migration from South America to Australasia, but at present no evidence of a counter movement to South America. (3) Nothing in the distribution of mollusks would lead to the hypothesis that South Africa has ever been connected with Antarctica and thereby indirectly with southern South America.

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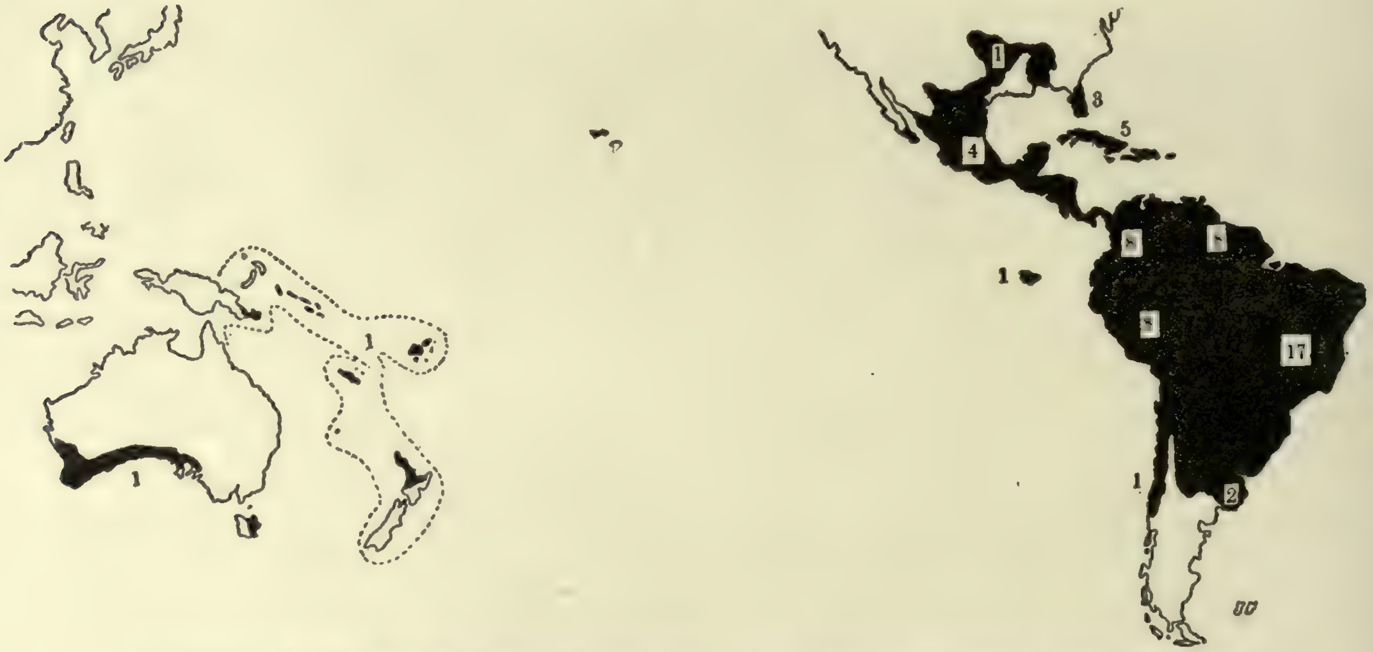
[1] Dr. Ortmann agrees with von Ihering in isolating a Chilian and southern Patagonian land mass of Cretaceous age, but he views it as an extension of Antarctica. The difference is rather one of names than of things. Proc. Amer. Philos. Soc., 1902, pp. 379, 381.

Non-marine mollusks having an Antarctic distribution belong to three families. The evidence in each case is briefly as follows:

1. The *Bulimulidæ*, land snails of South American origin, of which one genus (*Bothriembrion*) is found in Tasmania and southwestern Australia, another (*Placostylus*) in New Zealand, New Caledonia, the islands of Melanesia and as far east as Fiji. Both of these genera are distinct from South American forms, but they are undoubtedly related to the more generalized of the South American genera.

FIG. 37.



Distribution of the land snail family Bulimulidæ. The number of genera in each area is indicated by figures.

The presence of *Bulimulidæ* in Australia and Melanesia proves that the part of South America connecting with Antarctica was, or had been, connected with the old Brazilian evolution center.

2. The *Amnicolidæ*, a family of fresh-water snails, has one genus, *Potamopyrgus*, in New Zealand, Tasmania and South America. Another South American genus, *Potamolithus*, has its nearest ally in the genus *Petterdiana* of Tasmania and Australia. Both of these genera are exclusively fresh-water groups. See pp. 548–550 of this report.

3. The Naiades or fresh-water mussels found in all of the continents, are represented in Australia, Tasmania and New Zealand only by species which have been referred to the genus *Diplodon*. This genus is widely distributed in South America, especially southward. It is a relatively primitive genus and probably arose in South America, which, from the number of autochthonous genera, was evidently an old evolution center of Naiades. *Diplodon* is unknown in the northern continents. Whether the relationship with South American forms claimed for the Australia-New Zealand group is well-founded, remains to be confirmed by careful comparison of the soft anatomy.

The family *Endodontidæ*, and *Gundlachia* of the *Ancylidæ*, have been considered "Antarctic" groups, but on evidence of slight value. The *Endodontidæ* are an ancient group, world-wide in distribution. No close relationship has been shown to exist between the South American and the Australian genera. The former are unknown anatomically, and the relations of Australian and New Zealand forms, so far as positively made out, are with the groups of Polynesia and Micronesia (*Charopa*, *Thaumatodon*, etc.). Certain Tasmanian species may prove to belong to the American genus *Radiodiscus* Pils. See p. 516.

*Gundlachia* is found in Australasia, South America, the Antilles, Mexico, temperate North America and also the Miocene of central Europe. This wide distribution suggests that the genus may have reached the southern lands from the north. In the United States it has been found in California, Illinois, Ohio, New York, etc., but only at remote intervals and in very narrowly restricted areas. It is likely that it will turn up sooner or later in the Oriental region and Africa. I hesitate to claim *Gundlachia* as an inhabitant of Antarctica.

Pond snails of the family *Lymnæidæ* also occur in all the Austral lands, but South American forms do not seem especially related to Australasian. While *Endodontidæ*, *Gundlachia* and *Lymnæa may* have inhabited Antarctica, no data upon them now in our possession goes far towards proving that they did.

I can find no evidence to support Hedley's contention that the Macroogona (*Acavidæ*) of Tasmania and Australia, and the *Rhytididæ* of the same regions, New Zealand, New Caledonia, etc., are "of Antarctic origin."[1] These groups must have attained their distribution from South Africa to

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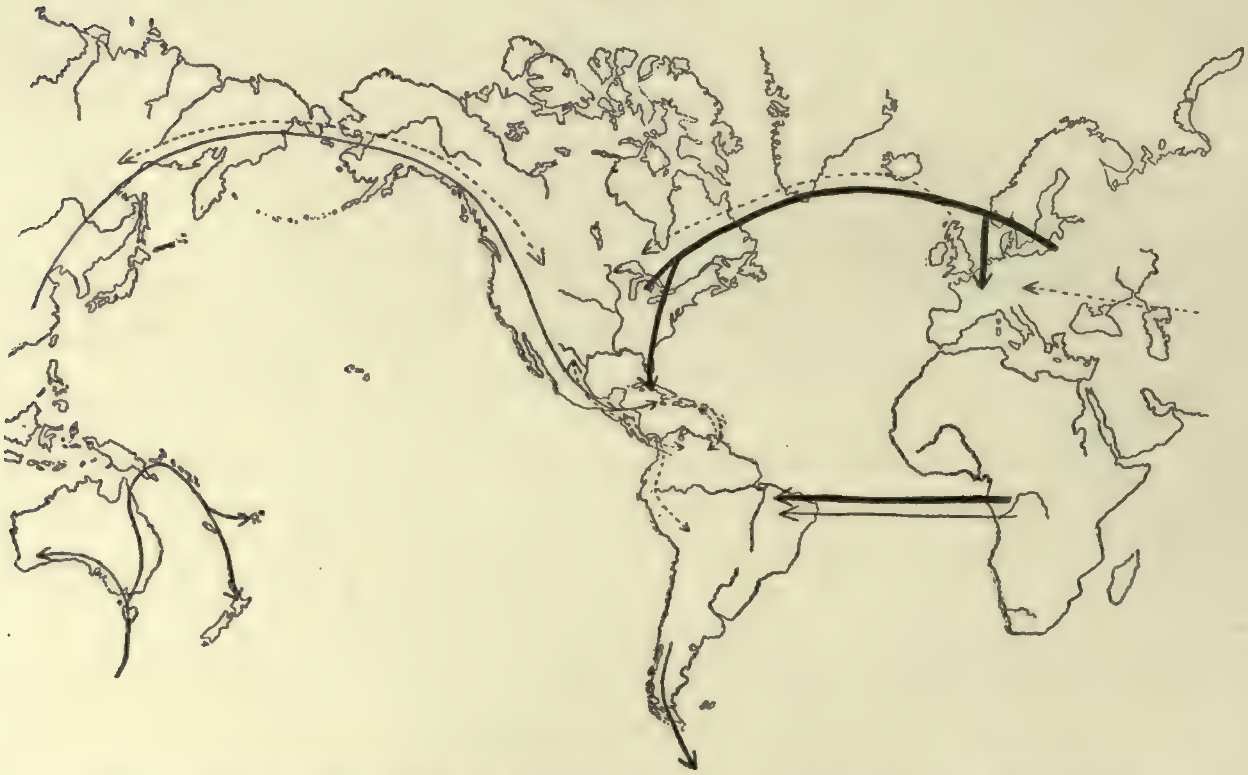
[1] Hedley, Proc. Linn. Soc. N. S. Wales, 1899, pp. 396, 398.

Australia by way of the Gondwana continent, leaving isolated genera by the way in Madagascar, the Seychelles, Ceylon and the Moluccas. To this Palæozoic and early Mesozoic land the South African *Endodontidæ*, *Peripatus*, etc., may also belong. The evidence for an isthmus connecting South Africa and Antarctica, as sketched by Forbes, Ortmann and some other palæogeographers, seems unsubstantial. Nothing in the distribution of non-marine mollusks lends it support.

FIG. 38.



Showing sources of the South and Middle American mollusk faunas. Early Mesozoic and earlier migrations in heavy lines, late Mesozoic lighter lines, Tertiary and later migrations in dotted lines.

The rather large size of the fresh-water mussels and *Bulimulidæ* precludes the idea of their distribution as adult organisms except by actual land connection. Some embryonic *Unionidæ* are probably carried by water birds, but we do not know that this is the case with *Diplodon;* moreover only short distances can be so traversed, since unionid embryos are known to die quickly out of water. It is hardly conceivable that Bulimulid eggs, which are smooth and not viscid, should be so carried. The same is true of the egg-capsules of *Amnicolidæ*. It would be absurd to suppose that they could ever be spread by aquatic birds.

Such evidence as we have favors the view that the connection of South America with Antarctica was transitory, hence taken advantage of by but few genera of mollusks, all belonging to families richly developed in the South American center. So far as non-marine mollusks show, the migration from South America of a few species belonging to three families will account for all the common elements in the austral lands of the two hemispheres. The strong generic differentiation of all the common austral groups, with the exception of *Potamopyrgus* and probably *Diplodon*, indicates that the connection was of considerable antiquity, probably, as Dr. Ortmann holds, not later than Eocene.

*Summary.*—The South American molluscan fauna is traceable to two sources: an ancient southern continent lying across the south Atlantic and enduring from at least Palæozoic to near the end of Cretaceous time, and to Miocene and Pliocene to recent connections with the middle American area. Antarctica was not an evolution center for mollusks, but there is strong evidence that a few groups passed by the Antarctic route to Australasia. "Archiplata," owing to its physical diversity from the Brazilian and Colombian areas, has became a Tertiary evolution center for a few groups of Brazilian origin.

Middle America (Antilles + Central America and part of Mexico) has the characteristics of an old evolution center of the northern faunal group, its primitive fauna coming from the north, and now showing phylogerontic features; a later (probably late Cretaceous) element was derived from the East Asiatic fauna. Both elements contributed, during the last half of the Tertiary, to the South American fauna, and received immigrants in return.

The "Nearctic Realm," so far as the genesis of its faunas is concerned, is composite.

## PART VI.

# CRUSTACEA OF SOUTHERN PATAGONIA.

BY

A. E. ORTMANN,
CARNEGIE MUSEUM, PITTSBURGH.

## LETTER OF TRANSMITTAL.

*Sir:*

I have the honor to transmit herewith the report on the recent Crustacea collected in Patagonia by Mr. J. B. Hatcher.

The collection is a small one, and contains, of marine forms, only such as are more or less well known, adding, however, for some of them new localities on the eastern coast of Patagonia, a region that scarcely has been properly investigated.

The most valuable part of the collection consists of freshwater Crustaceans found by Mr. Hatcher in the interior of southern Patagonia: among them are several very important new and rare species.

Very respectfully, your obedient servant,
ARNOLD E. ORTMANN, PH.D

DR. W. B. SCOTT,
PROFESSOR OF GEOLOGY,
PRINCETON UNIVERSITY.

## INTRODUCTION.

The collections of Crustaceans made by Mr. J. B. Hatcher in southern Patagonia are partly marine, partly freshwater. The following are localities from which marine forms have been secured: they are all close to the shore, in shallow water, and are situated—with the exception of the first—on the eastern coast of Patagonia.

1. Punta Arenas, Straits of Magellan.
2. Gallegos, at the mouth of the Gallegos River, South Patagonia.
3. Cape Fairweather, entrance of Gallegos Bay, northern side.

4. Mount of Observation, about 50 miles southwest of Santa Cruz.
5. Mouth of Santa Cruz River, situated at about 50° S.
6. San Julian, about 50 miles northeast of Santa Cruz.

Freshwater material has been collected at numerous localities in the interior. This has been numbered by Mr. Hatcher according to stations, and the character and description of each station is given in the text under each species. All these stations are situated in the region of the Rio Chico (northern tributary of the Santa Cruz River), from near the ocean up to the foothills of the Cordilleras, in 47–50° S. The localities Sierra Oveja and Sierra Ventana are on the Rio Chico. Arroyo Gio is in the foothills of the Cordilleras.[1] The highest altitude at which specimens were obtained is at about 2,000 feet.

## List of Species Represented in the Collection.

CIRRIPEDIA.

1. *Lepas anatifera* L.
2. *Elminius kingi* Gr.
3. *Balanus lævis* Brug.

COPEPODA.

4. *Pseudoboeckella longicauda* (Dad.).
5. *Pseudoboeckella entzi* (Dad.).

BRANCHIOPODA.

6. *Herpetocypris obliqua* Dad.
7. *Eucypris sarsi* Dad.
8. *Daphnia hastata* Sars.
9. *Lepidurus hatcheri* sp. nov.
10. *Branchinecta granulosa* Dad.

ISOPODA.

11. *Iais pubescens* (Dan.).
12. *Edotia tuberculata* (Guér.).
13. *Rocinela australis* Sch. & Mein.
14. *Exosphæroma gigas* (Leach).
15. *Exosphæroma lanceolatum* (Wh.).
16. *Cymodocea darwini* Cunn.
17. *Dynamene eatoni* Mrs.
18. *Cassidina emarginata* M.–E.

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[1] See Hatcher, J. B., Rep. Princeton Exped. Patagonia, vol. 1, Narrative and Geography, map.

19. *Serolis paradoxa* (Fabr.).

AMPHIPODA.

20. *Hyalella patagonica* sp. nov.

DECAPODA.

21. *Lithodes antarctica* Jacq.
22. *Paralomis granulosa* (Jacq.).
23. *Munida subrugosa* Dan.
24. *Munida gregaria* (Fabr.).
25. *Eurypodius latreillei* Guér.
26. *Halicarcinus planatus* (Fabr.).
27. *Hypopeltarium spinosulum* (Wh.).

Further, there are a few marine *Amphipoda,* and some *wood-lice* in the collection, but the material is too scanty to justify an attempt at identification.

## Order CIRRIPEDIA.

### Family *LEPADIDÆ* Darwin.

### LEPAS Linnæus.

### LEPAS ANATIFERA Linnæus.

1851 *L. a.*, Darwin, Mon. Cirr. Lep., p. 73, pl. 1, f. 1.
1897 *L. a.*, Weltner in: Arch. f. Naturg., v. 1, p. 244.

*Locality.*—Mouth of Santa Cruz River, two small colonies of young individuals upon fragments of kelp.

*Distribution.*—Almost cosmopolitan.

### Family *BALANIDÆ* Darwin.

### ELMINIUS Leach.

### ELMINIUS KINGI J. E. Gray.

1854 *E. k.*, Darwin, Mon. Cirr. Bal., p. 348, pl. 11, f. 6.
1897 *E. k.*, Weltner in: Arch. f. Naturg., v. 1, p. 256.

*Locality.*—Punta Arenas, 1 specimen.

*Distribution.*—Falkland Islands; Tierra del Fuego; Chiloë; Chili. Shallow water.

### BALANUS da Costa.

### BALANUS LÆVIS Bruguière.

1854 *B. l.*, Darwin, Mon. Cirr. Bal., p. 227, pl. 4, f. 2.
1897 *B. l.*, Weltner in: Arch. f. Naturg., v. 1, p. 263.

*Locality.* — Punta Arenas, numerous specimens.

*Distribution.* — Tierra del Fuego and Straits of Magellan; Chili; Peru; California. On the Atlantic coast of South America northward to Rio Grande do Sul, South Brazil. 0–20 fathoms.

*Remarks.* — All our specimens represent the typical variety of this species.

## Order COPEPODA.

### Family *CENTROPAGIDÆ* Giesbrecht.

### PSEUDOBOECKELLA Mrazek.

The original genus *Boeckella* of Guerne and Richard (1889, p. 151), created for the preoccupied *Boeckia* of Thomson (1883) was divided by Mrazek (1901) and von Daday (1902) into several genera. Of course, Mrazek's names have the priority. Unfortunately both divisions do not completely agree, and the names chosen by either author are apt to give origin to confusion. Generally, we may say that *Pseudoboeckella* of Mrazek corresponds to *Boeckella* of v. Daday, and *vice versa*, although Mrazek puts *B. bergi* Rich. into a separate genus (*Boeckellopsis*), while it is included in v. Daday's *Pseudoboeckella;* and although *B. brevicauda* Brad., which is included in v. Daday's *Boeckella,* forms the genus *Paraboeckella* of Mrazek.

The two species mentioned here have been described by v. Daday under *Boeckella* (sens. strict.), and seem to belong to *Pseudoboeckella* of Mrazek.

### PSEUDOBOECKELLA LONGICAUDA (Daday).

1901 *Boeckella l.*, v. Daday in: Term. Füz., v. 24, p. 346.
1902 *B. l.*, v. Daday, ibid., v. 25, p. 243, pl. 6, f. 10–14, 16.

| | | |
|---|---|---|
| *Localities.*— | Stat. 2 | 2 ♂ about 25 ♀ |
| | Stat. 6 | 2 ♀ |
| | Stat. 34 | 1 ♀ |

*Distribution.*—Swamp near Amenkelt, lower Rio Santa Cruz, Patagonia (about 50° S., 69° W.).

*Remarks.*—Our specimens agree perfectly with v. Daday's description.

#### PSEUDOBOECKELLA ENTZI (Daday).

1901 *Boeckella e.*, v. Daday in: Term. Füz., v. 24, p. 345.
1902 *B. e.*, v. Daday, ibid., v. 25, p. 239, pl. 6, f. 3–9.

| | |
|---|---|
| *Localities.*—Stat. 4. Pool, drying up, 10 miles above Sierra Ventana. | 6 ♂ 13 ♀ |
| Stat. 26 | 5 ♂ 5 ♀ |

*Distribution.*—Known from swamps and pools of several localities in the region near the mouth of the Santa Cruz River, Patagonia (about 50° S., 68–69° W.).

# Order BRANCHIOPODA.

## Suborder OSTRACODA.

### Family *CYPRIDÆ*.

### HERPETOCYPRIS Brady.

#### HERPETOCYPRIS OBLIQUA Daday.

1902 *H. o.*, v. Daday in: Term. Füz., v. 25, p. 296, textf. a, b, pl. 15, f. 8–13.

| | |
|---|---|
| *Localities.*—Stat. 2 | 27 spec. |
| Stat. 6 | about 10 empty shells. |
| Stat. 34 | 3 spec. |
| Stat. 53 | 24 spec. |

*Distribution.*—Swamps near Amenkelt, lower Santa Cruz River, Patagonia.

### EUCYPRIS Vavra.

#### EUCYPRIS SARSI Daday.

1902 *E. s.*, v. Daday in: Term. Füz., v. 25, p. 294, textf. a–c, pl. 15, f. 1–7.

| | |
|---|---|
| *Locality.*—Stat. 4 Pool, drying up, 10 miles above Sierra Ventana, Rio Chico. | 14 specimens. |

*Distribution.*—Swamp near Amenkelt, lower Santa Cruz River, Patagonia (about 50° S., 69° W.).

*Remarks.*—As v. Daday states, only young individuals possess the peculiar sculpture of the shell by longitudinal ridges represented in the figures 1 and 2 on v. Daday's plate 15.

## Suborder CLADOCERA.

### Family *DAPHNIDÆ* Dana.

### DAPHNIA O. F. Mueller.

### DAPHNIA HASTATA Sars.

1896 *D. pulex* var. *hastata* Richard in: Ann. Sci. nat. Zool. ser. 8, v. 2, p. 246, pl. 24, f. 16, pl. 25, f. 12, 18.

1902 *D. hastata* v. Daday in: Term. Füz., v. 25, p. 279, pl. 11, f. 11, 12.

*Localities.*—Stat. 4 Pool drying up, 10 miles above Sierra Ventana. 40–50 specimens, all ♀.
Stat. 26 a few ♀.

*Distribution.*— *D. pulex* var. *hastata* is found, according to Richard, in Europe (Austria, Russia, Norway). The Patagonian form has been recorded by v. Daday from Misionaros on the lower Santa Cruz River (49° 59′ S., 68° 33′ W.).

*Remarks.*—Our specimens correspond to the Patagonian form described under this name by v. Daday. As v. Daday himself admits, this is not exactly the same form as that described by Richard as *D. pulex* var. *hastata.*

## Suborder PHYLLOPODA.

### Family *APODIDÆ* Burmeister.

### LEPIDURUS Leach.

### LEPIDURUS HATCHERI sp. nov.

(Plate XLVIII, Figs. 1*a* and 1*b*.)

*Locality.*—First water hole north of basalt ridge, 50 miles from Rio Chico. 1,950 feet. 26 Febr., 1899.—2 ♀. (Foothills of Cordilleras, about 47–48° S.)

*Description.*—Scutum large, suboval, emarginate behind, covering about two thirds of the body. Of the abdomen, 9 or 10 segments (including telson) are uncovered. Eyes elliptic, closely approaching one another in front, diverging behind. First cervical furrow almost straight, second one strongly curved backward in the middle, and slightly shallower in the middle, but distinct. Median keel indistinct anteriorly, very distinct posteriorly. Lateral margins smooth, only near the posterior corners, for a short distance, very finely crenulated. Posterior emargination with small, somewhat irregular spinules, the median one (end of median keel) the largest. Supra-antennal keel slightly sinuate, apparently smooth, but under the lens there are fine and minute granulations.

Flagella of first pair of feet short, unequal, slightly depressing the margins of the scutum. Free abdominal segments spinulose, about 6–8 spinules on upper side; these are larger, straight, and arranged somewhat irregularly; those of the ventral side are smaller, numerous.

Telson (fig. 1*b*) on upper side, near base of cercopoda, on either side with a small, spinulose tubercle. Caudal flap elongate, over twice as long as wide at the base, with parallel margins, sublanceolate at the end and rounded; distal half of margin spinulose, with the strongest spinule at the end. Upper surface with a median, longitudinal keel bearing four strong spinules.

Cercopoda almost as long as the rest of the body, thickly covered with bristles.

Color deep green, lower parts pale greenish, mandibles brownish.

Size: Length of body 40 and 46 mm. Total length of larger individual (including cercopoda), 77 mm.

*Remarks.*—At first there seemed to be no doubt to me that our specimens ought to be referred to *L. patagonicus* Berg (1900), which comes from near the same region (Territ. of Chubut), but a careful comparison of our specimens with Berg's description reveals the following discrepancies:

1. Of the abdomen, only 10 segments are exposed in our species, while in *L. patagonicus* 15–16 are seen. Thus the abdomen of the latter appears to be longer.

2. In *L. patagonicus* the eyes are said to be suboval, and not to approach one another anteriorly, while in our species they are elliptic and distinctly convergent in front.

3. The lamina caudalis, in *L. patagonicus*, is one third longer than broad; in our species it is distinctly more than twice as long as broad. This is the most striking difference. Through the kindness of Mr. A. J.

Pendola of the museum in Buenos Aires, I possess sketches of the caudal flap of Berg's species, which show that it is only very slightly longer than broad.

4. There seems to be more of a ferrugineous color on the lower side of the body in *L. patagonicus.*

5. The size of *L. patagonicus* is smaller, body 30–35 mm., and including cercopoda, 43–46 mm., while our species, without cercopoda, reaches 46 mm.

Berg describes a male, while our specimens are females, but I hardly believe that the above differences are due to sex, since it is characteristic in this family that ♂ and ♀ hardly differ, except for the smaller size of the ♂, and the larger caudal flap of the ♂. While the first character would apply to this case, the second does not, the caudal flap being much larger in our ♀. On the other hand, the longer abdomen in the ♂ would agree with the same condition found in the ♂ of *L. bilobatus.*

For the rest, our species resembles *L. angasi* Baird (1866, p. 122, pl. 12, f. 1) from South Australia (Adelaide). Here the general form of the body and the characters of the various parts are almost identical, and I find only the following differences:

1. *L. angasi* is much smaller (1 inch = 25 mm.).
2. The body is of horn-color instead of green.
3. The spinules of the abdomen are curved downward in *L. angasi,* while they are straight in our species.

In all other respects, both species are closely allied, especially the following important characters agree:

1. Number of exposed abdominal segments: 12 in *L. angasi* (according to figure), 10 in our species.
2. Eyes of the same size and shape (according to figure of *L. angasi*).
3. Keel of scutum, and fine dentations on posterior part of lateral margins similar in both.
4. Cervical furrows identical (according to figure of *L. angasi*).
5. Caudal flap absolutely identical in form, but it seems that the margins are denticulated all around in *L. angasi.*

The apparently close affinity of our species with the South Australian *L. angasi* demands an investigation of the relationship of it with the other known species of the genus, and we may state the following:

1. *L. glacialis* (Kr.) (see Simon, 1886). Arctic regions.

For a comparison with our species this is out of the question, on account of the short flagella of the first legs, and the very short caudal flap.

2. *L. lubbocki* (Brauer), from Sicily and Algiers, and *L. macrurus* Lilj. from Archangel, Russia (see Simon, 1886), have a carina of the scutum that is sharp from its beginning at the second cervical furrow down to the hind margin. These two species are closely allied to *L. apus* (L.) from Europe (see below), which is in some degree related to our species, but just in the character mentioned here they deviate more considerably from *L. hatcheri*, than *L. apus* does.

3. Of the North American species (see Packard, 1883), *L. bilobatus* Pack. from Colorado is entirely different in the bilobate caudal flap and the longer abdomen (12 segments exposed in the ♂, 16 in the ♀). *L. couesi* Pack. from Montana and Utah differs in the much shorter abdomen, and the longer and distinctly spatulate caudal flap. *L. packardi* Simon (1886, p. 448) from California differs at once in the very short abdomen, in the second cervical furrow, which is interrupted in the middle, and in the median keel of the caudal flap, which has 7–8 spines.

4. Of the other Australian species (aside from *L. angasi*), *L. viridis* Baird (1850, p. 254, pl. 17, f. 1) from Tasmania has a distinct carina of the scutum, and the caudal flap is oval (narrower at the base). *L. viridulus* Tate (1876, p. 136, and Brady, 1886, page 88, textfig. E) from Adelaide has the abdomen very short, and the caudal flap is distinctly spatulate.

5. The two New Zealand species, *L. kirki* and *compressus* Thomson (1879, p. 260, pl. 11, f. 4, 5) are also distinctly different: in *L. kirki* a much larger part of the abdomen is covered, and, although the caudal flap resembles somewhat that of *L. hatcheri*, it is shorter. *L. compressus* is entirely different in the shape of the scutum, which is oval and narrow, keeled only posteriorly; the caudal flap is much shorter and the margin of the scutum is smooth.

Thus there only remain for comparison *L. apus* from central and northern Europe, and *L. angasi* from South Australia. Of these, *L. apus* (L.) resembles our species in general form, length of abdomen (8 exposed segments), in the character of the carina of the scutum; but it differs:

1. In the second cervical furrow, which is interrupted in the middle.

2. In the caudal flap, which is oval, narrower at the base, and about twice as long as wide.

3. In the eyes, which are said to be reniform.

*L. angasi* is still more closely allied to *L. hatcheri*, as has been demonstrated above, especially the caudal flap is almost identical. This close relation of these two species is especially interesting from a zoögeographical point of view.

## Family *BRANCHIPODIDÆ* Baird.

### BRANCHINECTA Verrill.

### Branchinecta granulosa Daday.

(Plate XLVIII, Fig. 2.)

1902 *B. g.* von Daday in: Term. Füz., v. 25, p. 288, pl. 13, f. 3–14, pl. 14, f. 1, 2.

*Localities.* — Pools near Sierra Ventana, 1898. — 5 ♂. Stat. 4, Pool drying up, 10 miles above Sierra Ventana. — 6 ♂, 11 ♀. 5 miles above Sierra Oveja. — Numerous ♂ and ♀, poorly preserved. Pool, 25 miles above Sierra Oveja, Febr. 21, 1899. — 5 ♂, 14♀.

(All these localities are in the region of the Rio Chico, in about 49° S., and 70–71° W.)

*Distribution.* — Swamp near Amenkelt (lower Santa Cruz River), Patagonia (50° S., 69° W.).

*Description.* — Allied to *B. coloradense* Packard (1883, p. 338, textfig. 19) from Colorado and (according to Lilljeborg) Fresno, California, and still more closely to *B. iheringi* Lilljeborg (1891, p. 424, and v. Ihering, 1895, p. 178) from Rio Grande do Sul, Brazil.

The chief differences are found in the male claspers (second antennæ) (fig. 2), which are very robust and long (extended, almost as long as the anterior portion of the body). Basal joint subcylindrical, slightly curved, with a distinct tubercle (knob) at the base on inner side. Inner margin in the distal half with a prominent crest, the edge of which is finely dentate. The inner margin of first joint, between this crest and the basal knob, is concave. Second joint almost as long as the first, compressed and lamelliform, and a little narrower than the first joint, with nearly parallel margins; slightly concave on under side (if this joint is stretched out, the concave side is the outer side), curved, and near apex strongly bent, where the margins form a distinct lobe on each side, rendering the end of the second joint trilobate, the middle lobe being strongly deflected from the general plane.

In the female the claspers are very short, stout, straight, slightly tapering and suddenly truncated at the end, with the outer margin produced into a short spine. Ovisac very long, two thirds as long as the abdomen, reaching to the penultimate abdominal segment; its end pointed.

Caudal appendages, in both sexes, rather long, about twice as long as the terminal segment.

Length of body (in male and female), about 15 mm.

*Remarks.* — I had drawn up the above description, before I became acquainted with von Daday's paper. After having seen the latter, I was at once convinced that our specimens belong to this species, although my description does not agree completely with that given by von Daday, But this seems to be due to a different interpretation we have given to the microscopic image, and after a renewed examination, I do not see any reason why I should alter my original account.

The description of *B. iheringi*, given by Lilljeborg, applies in some degree, as far as it goes, to our species. Lilljeborg says that there are a few small spinules on the inner side of the first joint of the male claspers, and that the second joint has, at the apex, a tubercle on the posterior margin, and a tuberosity on the anterior side. While this structure appears to be similar to that found in our species, the spinules of the first joint are, in the latter, represented rather by a denticulate crest, and, further, Lilljeborg does not mention the peculiar laminate form of the second joint, which, in our species, has no tubercles or tuberosities at the apex, but rather lamelliform lobes. (The peculiar shape of this joint is, in my opinion, not quite correctly understood by von Daday.) Finally *B. iheringi* is smaller than our species, only 8 mm. the ♀, 11 mm. the ♂, while *B. granulosa* attains, according to our material, 15 mm., and according to von Daday 15–18 mm. Thus *B. granulosa* seems to be different from *B. iheringi*, although closely allied to it.

## Order ISOPODA.

### Family *JANIRIDÆ* Sars.

### IAIS Bovallius.

### Iais pubescens (Dana).

1891 *I. p.*, Dollfus, in: Miss. Cap Horn, v. 6, p. 70, pl. 8, f. 13.
1900 *I. p.*, Stebbing in: Pr. Zool. Soc., p. 549, pl. 38.

*Locality.* — Punta Arenas, 29 specimens (parasitic on *Exosphæroma gigas*).

*Distribution.* — Falkland Islands; Tierra del Fuego; Straits of Magellan; South Georgia; New Zealand, Tasmania; Kerguelen Islands.

## Family *EDOTIIDÆ* Dana.

### EDOTIA Guérin-Ménéville.

### Edotia tuberculata Guérin-Méneville.

1883 *E. t.*, Miers in: Journn. Linn. Soc. v. 16, p. 72, pl. 3, f. 3–6.
1891 *E. t.*, Dollfus in: Miss. Cap Horn. v. 6, p. 69, pl. 8*a*, f. 12.

*Localities.* — Punta Arenas, 7 sp.; Mouth of Santa Cruz River, 3 sp.; San Julian, 18 sp. (most of the latter young).

*Distribution.* — Falkland Islands; Tierra del Fuego; Straits of Magellan.

## Family *CYMOTHEIDÆ* Hansen.[1]

### ROCINELA Leach.

### Rocinela australis Schioedte & Meinert.

1879 *R. a.*, Schioedte & Meinert in: Naturh. Tidsskr. (3), v. 12, p. 397, pl. 12, f. 13–16.
1898 *R. a.*, Richardson in: Pr. Amer. Philos. Soc., v. 37, p. 11.

*Locality.* — Gallegos, 1 ♀ adult.

*Distribution.* — Straits of Magellan.

## Family *SPHÆROMIDÆ* White.

### EXOSPHÆROMA Stebbing.

### Exosphæroma gigas (Leach).

1891 *Spæroma g.*, Dollfus in: Miss. Cap Horn, v. 6, p. 62, pl. 8*a*, f. 6.
1900 *Exosphæroma g.*, Stebbing in: Pr. Zool. Soc., p. 553, pl. 39 (and synonyma, excl. *lanceolatum* White).[2]

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[1] Subfamily: *Æginæ*, compare Hansen, H. J., Isopoden, Cumaceen und Stomatopoden der Plankton Exped. in: Ergebn. Plankton Exp., v. 2, G. c, 1895.

[2] *Sphæroma lanceolatum* of Dana, Cunningham, Miers, belongs to this species. Studer (1884), who had specimens from Kerguelen and New Zealand, as well as from the Straits of Magellan, keeps both sets separate, and calls the first by the name of *S. gigas*, the second by that of *S. lanceolatum*, but he does not give any characters, so that it is impossible to decide, whether his *S. lanceolatum* is really that of White.

*Locality.*—Punta Arenas, several hundred specimens, young and adult.

*Distribution.*—Falkland Islands; Tierra del Fuego; Straits of Magellan. Shallow water. This species also has been reported from New Zealand, Auckland Islands, Australia, and Kerguelen Islands.

*Remarks.*—Our largest individuals attain the length of about 25 mm., by a width of about 15 mm. They all agree in the essential characters, and represent the typical form of *E. gigas*, as described and figured by Stebbing, with the only exception that in Stebbing's figure of the whole animal (pl. 39) the outer ramus of the uropods is broader than in our individuals, in which it is distinctly narrower, the end being sometimes subacute, sometimes rounded. In this respect, our specimens correspond better with the figure given by Dollfus, yet Dollfus says that there are variations in this respect.

### EXOSPHÆROMA LANCEOLATUM (White).

1843 *Sphæroma gigas* var. *lanceolata* White in: Ann. Nat. Hist., ser. 1, v. 12, p. 345.

1891 *S. calcarea* Dollfus in: Miss. Cap Horn, v. 6, p. 64, pl. 8*a*, f. 7.

1900 *Exosphæroma gigas* (pro parte) Stebbing in: Pr. Zool. Soc. (only single individual described on p. 557).

*Localities.*—Mouth of Santa Cruz River, 1 smooth, 14 sculptured specimens; San Julian, 3 smooth, 2 sculptured specimens.

*Distribution.*—Falkland Islands and Tierra del Fuego (region of Cape Horn). Shallow water to 95 m.

*Description.*—This species differs from the foregoing in the following particulars:

1. In the smaller size. While *E. gigas* attains 25 mm., Dollfus gives, for this species, only 12 mm., and our largest is 14 mm. White gives ¾ to 1 inch (18–25 mm.), but these measurements apparently include *E. gigas*.

2. In the epimera of the peræon-segments, which are abruptly bent down, so as to form a sharp angle with the middle of the back, which is sometimes cariniform. This character is very important, and never found in *E. gigas*.

3. In the sculpture of the posterior peræon-segments, of the pleon and telson. This sculpture varies considerably, but in *E. gigas* there is no sculpture at all.

4. In the more narrowed apex of the telson, which may be called subacute, and which is a little more produced than in *E. gigas.*

*Remarks.*—As regards the third character, given above, the original description of White says that the last joint of the abdomen has, near the base, a slight elevation, grooved in the middle. Stebbing says that there is, on the telson of the specimen he is inclined to refer to this form, a longitudinal groove between two elevations, and then a carina running to the end. I have asked for further information from Mr. Stebbing, and, in a letter, he kindly has furnished the additional character, that the last three segments of the peræon have, along the hind margin of each, four small tubercles.

Among our material, those specimens called the "smooth form," show exactly the characters given by White and Stebbing: a low elevation on the telson, divided by a groove, and an indistinct median keel running backward, so that there is no doubt that they belong to White's *S. lanceolatum.* I do not see, however, the four tubercles observed by Stebbing on the peræon-segments. The pleon and telson of these individuals possess fine granulations.

As regards *S. calcarea* of Dollfus, the chief characters are, beside the double keel in the anterior part of the telson, and the single median keel in the posterior, the distinct and prominent granulations on the posterior part of the body, chiefly on the telson. This character is strongly pronounced, among our specimens, in those that have been called above the "sculptured form." These granulations are somewhat irregular, and assume sometimes an almost vermiculate appearance. This form also shows the four little tubercles on the hind margins of the three posterior peræon-segments, observed by Stebbing. There is much variety in the degree of development of the granulations.

The fact that Dollfus mentions a smooth form, and that these two forms, the smooth and the sculptured, also have been found associated by Mr. Hatcher at Santa Cruz and San Julian, while the typical *E. gigas* is found not at all at these localities; and further, the fact that among the large number of *E. gigas* collected by Hatcher at Punta Arenas not a single individual of these forms has been discovered, is much in favor of the view that they really belong together, that is to say, to White's *S. lanceolatum.* All our specimens from Santa Cruz and San Julian differ in the same four characters, mentioned above, from *S. gigas*, and further, Mr. Stebbing informs me that Dollfus' *S. calcarea* might very well be a form of that, which he is inclined to take for White's *S. lanceolatum*.

The question remains, whether Dollfus was justified in calling his species by the name of *S. calcarea* Dana. Dana's species came from Tierra del Fuego, but his description and figure (1852, p. 776, pl. 52, f. 2) do not give any characters that warrant this identification, and considering the adverse conditions by which Dana was hampered in the preparation of his figures and diagnoses (see Stebbing, 1900, p. 528), we had better disregard *S. calcarea* Dana altogether.

As regards the outer ramus of the uropods, which is given by White as an additional distinctive character of *S. lanceolatum*, I cannot say that it is very distinct from that of *E. gigas*. It is lanceolate, mostly rounded at the apex, but sometimes subacute, and offers about the same shape and variations as in *E. gigas*.

This species also belongs to the genus *Exosphaeroma* as defined by Stebbing.

### CYMODOCEA Leach.

#### CYMODOCEA DARWINI Cunningham.

1871 *C. d.*, Cunningham in: Trans. Linn. Soc., v. 27, p. 499, pl. 59, f. 1.
1884 *C. d.*, Studer in: Abh. Akad. Berlin, p. 18, pl. 2, f. 6.
1886 *C. d.*, Beddard in: Rep. Voy. Challenger, v. 17, p. 150.
1891 *C. d.* Dollfus in: Miss. Cap Horn, v. 6, p. 65, pl. 8, f. 8.

*Localities.* — Mouth of Santa Cruz River, 1 sp. — San Julian, 1 sp.

*Distribution.* — Falkland Islands; Tierra del Fuego; East coast of S. Patagonia (off Port Desire, 47° S.); Kerguelen Islands. 0–127 fathoms.

### DYNAMENE Leach.

#### DYNAMENE EATONI Miers.

1875 *D. e.* Miers in: Ann. Nat. Hist., ser. 4, v. 16, p. 73.
1879 *D. e.* Miers in: Philos. Trans., v. 168, p. 203, pl. 11, f. 2.
1891 *D. e.* Dollfus in: Miss. Cap Horn, v. 6, p. 66, pl. 8, f. 9.

*Locality.* — San Julian, 1 sp.

*Distribution.* — Tierra del Fuego (region of Cape Horn); Kerguelen Islands.

### CASSIDINA Milne-Edwards.

#### CASSIDINA EMARGINATA Milne-Edwards.

1887 *C. e.* Pfeffer in: Jahrb. Hamburg. Wiss. Anstalt., v. 4, p. 103, pl. 2, f. 9, 10, pl. 5, f. 23–30, pl. 6, f. 1–10.
1891 *C. e.* Dollfus in: Miss. Cap Horn, v. 6, p. 67, pl. 8, f. 10.
1901 *C. e.* Stebbing in: Proc. Zool. Soc., p. 562.

*Localities.* — Punta Arenas, 1 ♂; Mouth of Santa Cruz River, 12 sp. (♂ and ♀); San Julian, 7 sp. (♂ and ♀).

*Distribution.* — Falkland Islands; Tierra del Fuego; Straits of Magellan; Channels of western Patagonia; South Georgia; Kerguelen Islands. 0–120 m.

## Family *SEROLIDÆ* Dana.

### SEROLIS Leach.

#### SEROLIS PARADOXA (Fabricius).

1884 *S. p.* Beddard in: Rep. Voy. Challenger, v. 11, p. 33, pl. 5, f. 12–14.
1891 *S. p.* Dollfus in: Miss. Cap Horn, v. 8, p. 61, pl. 8*a*, f. 4 (*nec* f. 5).

*Locality.* — Punta Arenas, 34 sp.

*Distribution.* — Falkland Islands; Tierra del Fuego; Straits of Magellan. Shallow water.

*Remarks.* — On Dollfus' plate 8*a*, the figures 4 and 5 are transposed, fig. 4 representing this species, while fig. 5 is *S. schythei* Ltk. (In the explanation of the plate, p. 76, the opposite is stated.)

# Order AMPHIPODA.

## Family *ORCHESTIIDÆ* Dana.

### HYALELLA S. J. Smith.

#### HYALELLA PATAGONICA spec. nov.

(Plate XLVIII, Figs. 3, *a–h*.)

*Localities.* — This species seems to be very abundant in southern Patagonia. Hatcher has collected it at about 30–35 localities in the region of the Rio Chico (47–50° S.), from near the coast to the Cordilleras (highest altitudes: 1,750 and 2,000 feet). It is found in springs, small streams and pools of fresh water, sometimes slightly alkaline (Arroyo Gio).

*Distribution.*—Although a new species, some previous references might possibly belong to it. As we shall see below, a locality from which Faxon mentions *H. dentata inermis*, may belong to this species, namely: Puerto Bueno, Smyth Channel, Straits of Magellan. The same form, *H. inermis* has been mentioned by Wierzejski (1892, p. 187) from a stream that issues from a lagune near Mendoza (northern Argentina), the water of which has an odor of sulphur. However, what this form really is, remains to be seen.

Cunningham (1871, p. 498, pl. 59, f. 14) mentions *Allorchestes patagonicus* from a freshwater stream near Punta Arenas. He does not give any description, since his single specimen was considerably injured, and the figure is quite poor, and, no doubt, even incorrect. It is possible that our species was intended, but we have no means of deciding this, and *Allorchestes patagonicus* must remain a "nomen nudum."

*Description.*—Body rather robust, general form agreeing with that of *H. dentata inermis* Sm. Eyes small, black, rounded, about twice their diameter distant from one another.

Antennulæ longer than the stalk of the antennæ, a little more than half as long as the whole of the antennæ. First and second joint of peduncle of the same length, third a little shorter. Flagellum with 10–12 joints in the ♂, and with 8–10 joints in the ♀.

Antennæ about one third as long as the body, or even shorter. The first joint of the peduncle short, the second a little longer, the third distinctly longer than the second. Flagellum with 12–17 joints in the ♂, and with 9–14 joints in the ♀.[1]

Maxillipeds (fig. 3, *a*) of the usual form, but all the joints are more slender than in *H. dentata inermis*.

First gnathopod of the ♂ (fig. 3, *b*): Meropodite with a blunt prominence on the inferior margin, which is beset with a number of setæ. Carpopodite about twice as long as meropodite (measured from the middle of the articulation with meropodite to the middle of articulation with propodite), upper margin with a sharp spine near the distal end, which has a group of setæ; lower margin with a very prominent, lobiform, rounded projection, the margin of which is fringed with stiff setæ. Propodite almost triangular, almost as wide as long, and about as long as carpopodite; palmar margin oblique, nearly straight, with several rows of setæ, which become spine-like at the outer end; just below this end there is a group of more numerous setæ. There is no excavation to receive the tip of the dactylus. Outer surface of palm with an oblique row of setæ. Dactylopodite slender, slightly curved.

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[1] The number of joints of the flagella of both antennulæ and antennæ varies with age: it is less in young individuals, greater in adults. Often the number differs on either side; this difference, however, is always slight, only amounting to one or two joints.

First gnathopod of ♀ (fig. 3, *c*) similar to that of the ♂, but propodite less distinctly triangular, and accordingly, less wide in proportion to length.

Second gnathopod of ♂ (fig. 3, *d*): meropodite with a triangular, pointed prominence on the lower margin. Carpopodite about as long as meropodite, with a narrow, pointed prolongation of the lower margin, which is longer than the width of the rest of the carpopodite. Palm (measured along the upper border) about 4 times as long as carpopodite, triangular, swollen, in general form very similar to that of *H. dentata inermis.* Palmar margin oblique, very slightly sinuous, with a series of small spines; the lower (outer) end with a depression to receive the tip of the dactylopodite, and around this depression with 2–3 stronger spines. Dactylopodite slender and curved.

Second gnathopod of ♀ (fig. 3, *e*) similar to the first gnathopods of ♂ and ♀, but meropodite with the prominence of the under margin more pronounced (but not triangular and pointed, as in the second gnathopod of the ♂); process of lower margin of carpopodite a little longer than that of the first gnathopod, and palm still more elongated, distinctly longer than the carpopodite, and less triangular than that of the first gnathopod of the ♀. (This is very dissimilar to that of *H. dentata inermis.*)

Peræopods: First (fig. 3, *f*), second and third of about the same length, fourth longer than third, fifth (fig. 3, *g*) about as long as fourth. The last (fifth) extends backward a little beyond the tip of the first uropod. Basipodite of third to fifth enlarged, oval, that of fifth pair larger than those of the third and fourth. Hind edge of third, fourth and fifth serrated, most distinctly so in the fifth. Accessory branchiæ on the first to the fifth peræopods. No ordinary branchiæ on fifth.

Uropods (fig. 3, *h*): First and second with spines on both rami. Third uropods: ramus about as long as the peduncle, only slightly extending beyond telson.

Telson (fig. 3, *h*), almost semicircular, or, more correctly, half-elliptic, with a pair of fine setæ on the rounded hind margin.

Color (in alcohol) whitish or grayish.

Length of large ♂: 14–16 mm.

*Remarks.* — The following species of *Hyalella* have been described, which approach more or less closely the present one:

1. *H. dentata* Smith (1874, Geol. Surv., p. 608, pl. 1, f. 3–6, and Rep. Fish Comm., p. 645, pl. 2, f. 8–10), United States.[1]

2. *H. inermis* Smith (1874, Geol. Surv., p. 609, pl. 1, f. 1, 2). Colorado, Utah, Florida.

This form is given by Faxon (1876, p. 373, textfig. 35) as *Allorchestes dentatus* var. *inermis* from the region of Lake Titicaca, from San Antonio, Peru (saline water, 3,300 feet above the sea), and from Puerto Bueno, Smyth Channel, Strait of Magellan (probably fresh water).

Faxon further describes (1876, pp. 374, 375, textfigs. 36, 37):

3. *Allorchestes dentatus* var. *gracilicornis* Fax., from near Campos (Rio de Janeiro), Brazil.

4. *Allorchestes longistilus* Fax., from the same locality.

Wrzesniowski (1879, pp. 176, 177, 199) describes:

5. *Hyale jelskii* Wrz., from Peru, east side of Cordilleras, 8,000 feet (Pumamarca).

6. *Hyale lubomirskii* Wrz., from Peru, west side of Cordilleras, 8,000 feet (Pacasmayo).

7. *Hyale dybowskii* Wrz., from Peru, west side of Cordilleras, 7,000 feet (Paucal, Montana de Nancho).

Finally, Stebbing (1899, pp. 406, 407, pl. 32, *A*, *B*) describes:

8. *Hyalella warmingi* Stebb., from Lagoa Santa (Prov. Minas Geraes, Brazil).

9. *Hyalella meinerti* Stebb., from "Laguna di Espino."[2]

All these forms belong to the genus *Hyalella*, founded by S. J. Smith (1874), and more sharply defined by Stebbing (1899, pp. 397–398) in his key to the genera of the family *Orchestiidæ*.

*H. dentata* from the United States differs from our species (and all the

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[1] As has been surmised by Smith and Faxon, this species is very likely identical with *Allorchestes knickerbockeri* Bate (1862, p. 36, pl. 6, f. 1) from New York, and possibly with *Amphithoë aztecus* Saussure (1858) from Vera Cruz, Mexico. If the latter should prove to be true, the specific name of *aztecus* should be used.

[2] I have tried to locate "Laguna di Espino," but have been unable to do so. Places called by the name of "Espino" are found in Honduras and Venezuela (prov. Guarico), but no "Laguna di Espino" is known to me.

rest) in the spiniform prolongation of the segments of the pleon. This character, however, seems to be of minor importance, since there are intergradations in this respect between the typical *H. dentata* and *H. inermis* in the United States (see Smith, 1874, Fish Comm., p. 647; specimens from Florida). Faxon regards *H. inermis* only as a variety of *H. dentata.*

In all other characters, *H. dentata* as well as *H. inermis* are closely allied to our species, especially the following characters agree:

1. General shape of body and eyes.
2. Length of antennulæ and antennæ. In *H. dentata* and *H. inermis* these are considerably shorter than half of the body.
3. Shape of the second gnathopod of the ♂. Especially the propodite is directly identical, as will be seen by comparing our figure (3*d*) with the figure of this joint of *H. dentata* (♂ ad.) given by Smith (1874, Geol. Surv., pl. 1, f. 3).
4. Relative length of the peræopoda.
5. Shape of uropods and telson.

The chief differences are the following:

1. The number of joints of both antennulæ and antennæ is greater in our species. Although these parts are about as long as those of *H. dentata* and *inermis*, the number of joints is slightly greater in *H. patagonica* (in *dentata* and *inermis*, 7–9 in the antennulæ, 8–12 in the antennæ; in *H. patagonica*, 8–12 in the antennulæ, 9–17 in the antennæ). The joints of the peduncles are a little different in length; while of those of the antennulæ, in *H. dentata* and *inermis*, the two distal ones are about alike, the last joint, in our species, is a little shorter than the second. In the antennæ, the second and third joints are alike in *H. dentata* and *inermis*, while, in *H. patagonica*, the third is distinctly longer than the second. These differences, however, seem to be of minor importance.
2. In the first gnathopod of the ♂ as well as the ♀, the propodite is, in *H. patagonica*, distinctly broader and more triangular; the propodite has a distinct lobiform prominence, which is much more developed than in *H. dentata* and *inermis*, and, consequently, the carpopodite appears shorter and broader in our species.
3. The same is true of the second gnathopod of the ♀: the carpopodite and propodite are shorter and comparatively broader in our species, and the process of the carpopodite is more pronounced. The propodite in *H. dentata* and *inermis* is much longer than in our species.

4. In our species, the meropodite of the second gnathopod of the ♂ has a triangular, pointed prominence on the lower margin, while in *H. dentata* and *inermis* this process is blunt and obtuse.

5. Size of our species much larger, up to 16 mm., while *H. dentata* and *inermis* measure not more than 6 mm.

Thus we see that *H. patagonica* differs from *H. dentata*, and especially from *H. inermis*, in some slight and unimportant features of the antennulæ and antennæ, and in some very marked characters of the first and second gnathopods of the ♂ and ♀, and in size. Nevertheless, these three forms seem to be very closely allied in the general shape of the body, length of antennulæ and antennæ, and the general shape of the chelæ of the second gnathopods of the ♂.

It remains doubtful, whether Faxon's *H. dentata* var. *inermis* from South America is really identical with the form of the United States. Faxon says that his Lake Titicaca specimens exhibit some differences in the shape of the propodite of the second gnathopods of the ♂, but his figure does not reveal them in a sufficient degree. Considering the fact that we possess several hundred individuals of our species, and that they all show a great uniformity in their characters, and that the differences mentioned above are constant among them, it is possible that also the Titicaca form — of which Faxon had only 6 specimens — might be a good species. As to the specimens from Peru and the Straits of Magellan, Faxon does not give any details of their characters, but I suspect very strongly that those from the latter locality really belong to our species.

*H. dentata* var. *gracilirostris* (Fax.) from Brazil differs at once from all others, discussed so far, in the much longer antennæ, which are half as long as the body. There may be other characters that differ, to which Faxon does not refer. He had only one female.

*H. longistilus* (Fax.) from Brazil differs at once in the third uropods, which are much longer, and in the longer antennulæ and antennæ. Carpopodite of second gnathopod of ♂ more oval, and less distinctly triangular.

*H. jelskii* (Wrz.) from Peru differs:[1]

1. Antennulæ and antennæ much longer, and the antennæ of the ♂

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[1] Wrzesniowsky does not give any figures of his species, and consequently we cannot form, in some points, a good idea as to their characters. Nevertheless his descriptions are generally clear, and do mention characters that show conclusively that his species are different from *H. patagonica*.

are two thirds of the length of the body. Number of joints about the same as in our species (antennæ of ♂, 18 joints).

2. Shape of first gnathopod different, the carpopodite large, distinctly longer (1½ times as long as propodite).

3. In the second gnathopods of the ♂, carpopodite about one third of the propodite (expression ambiguous: "dreimal kuerzer"), and propodite apparently shorter than in our species. For the rest, the propodite seems to possess a similar shape, although the spinules of the palmar margin seem to be different.

4. The propodite of the second gnathopod of the ♀ seems to be quite different, being 2½ times as long as broad.

5. No accessory branchiæ on the fifth peræopods.

6. Size smaller (5 mm.).

Thus it seems that this species is much more different from *H. patagonica* than *H. inermis*, especially in the shape of the antennulæ, antennæ and gnathopods.

*H. lubomirskii* (Wrz.) from Peru differs from our species:

1. Head shorter, and eyes oval (not round).

2. Antennulæ and antennæ longer (antennæ of ♂ over one half of the body). Number of joints slightly greater.

3. Second gnathopods of ♂ apparently similar to our species, but palmar margin cut into two lobes, and meropodite 1½ times as long as carpopodite. In the ♀, the propodite is longer than in our species, almost twice as long as wide.

4. Size smaller (6 mm.).

Here the first gnathopods are apparently more like *H. patagonica* (carpopodite hardly longer than propodite). This species resembles more *H. inermis* in the first and second gnathopods, but head, eyes, antennulæ and antennæ are different.

*H. dybowskii* (Wrz.) from Peru differs from our species:

1. Eyes oval, dilated below.

2. Antennæ longer (half as long as body). Number of joints of antennulæ and antennæ near that of our species (antnl. 10–13, ant. 14–15).

3. Carpopodite and meropodite of second gnathopod about one third as long as propodite.[1] For the rest the first and second gnathopods seem

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[1] "Zweimal kuerzer." This expression is very ambiguous, in a double sense.

to resemble those of *H. patagonica*, although the description is very short and incomplete.

This species seems to be the most closely allied form among those described by Wrzesniowsky; it differs, however, distinctly in the shape of the eyes and the length of antennulæ and antennæ.

*H. warmingi* Stebb., from Lagoa Santa, Brazil.

This species differs at once and strikingly in the shape of the propodite of the second gnathopod of the ♂, which is more oval, and in the shape of the first gnathopod and the second gnathopod of the ♀. Also the antennæ are much longer, so that we do not need to compare it further.

*H. meinerti* Stebb., from "Laguna di Espino."

This is entirely different in the third uropods, which resemble those of *H. longistilus* (Fax.), and further, the shape of the first and second gnathopods and the length of the antennæ are quite unlike our species.

Thus we see that the species most closely allied to *H. patagonica* is *H. inermis* of the United States. According to Faxon, this species (or variety) is also found in Peru, near Lake Titicaca, and in the region of the Straits of Magellan. Yet Faxon regards differences in the shape of the first and second gnathopods not as specific characters, and thus it is quite possible that his South American specimens represent good species, different from *H. inermis.* I have said above that the differences of *H. patagonica* from *H. inermis*, although seemingly unimportant, are constant among the large number of our specimens, and consequently, I am forced to regard this Patagonian form as a new and good species.

The fact that the type of fresh-water amphipods, represented in the United States by *Hyalella dentata* and *inermis* extends, apparently, throughout America, over Central and South America to the Straits of Magellan, while this genus is found nowhere else, is very interesting from a zoögeographical point of view.

## Order DECAPODA.

### Family *LITHODIDÆ* Dana.

### LITHODES Latreille.

### LITHODES ANTARCTICA (Jacquinot).

1891 *L. a.*, A. Milne-Edwards in: Miss. Cap Horn, v. 6, p. 24.
1896 *L. a.*, Bouvier in: Ann. Sci. nat., ser. 8, v. 1, p. 23.

*Locality.*—Punta Arenas, 2 ♂ 1 ♀.

*Distribution.*—Tierra del Fuego; Straits of Magellan; northward to Chiloë. Shallow water.

## PARALOMIS White.

### PARALOMIS GRANULOSA (Jacquinot).

1891 *P. g.* A Milne-Edwards in: Miss. Cap Horn, v. 6, p. 20.
1896 *P. verrucosa* Bouvier in: Ann. Sci. nat., ser. 8, v. 1, p. 26.
1900 *P. granulosa* Stebbing in: Proc. Zool. Soc., p. 532.

*Localities.*—Punta Arenas, 4 ♂ 3 ♀; Cape Fairweather, 2 ♂ jun.

*Distribution.*—Falkland Islands; Tierra del Fuego; Straits of Magellan. On the eastern Patagonian coast this species has been found as far north as Bahia Blanca (Prov. of Buenos Aires), 38° 42′ S. (Berg, 1900), while on the western coast it does not seem to go beyond Trinidad Channel (50° S.).

*Remarks.*—According to Stebbing, the specific name of *P. granulosa* has to supersede that of *P. verrucosa*, having been published (on Jacquinot's plate) not later than in 1847, while *L. verrucosa* of Dana was published in 1852.

The two young individuals from Cape Fairweather correspond closely to *L. verrucosa* of Dana (1852, p. 428, pl. 26, f. 16). Both have the length of the carapace, 27 mm. The specimens from Punta Arenas are all larger, and most of them seem to be adult; the smallest, a soft shell female, is 61 mm. long (carapace only), and this one is intermediate in sculpture between the young and adult specimens; the tubercles of the surface are more crowded than in the latter, but a little more distant from each other than in the former. The same is true of the granulations of these tubercles, they being less developed than in *P. verrucosa*, but more strongly than in the adult individuals. Length of adult males: 92, 101, 107 mm.; of an adult female: 72 mm.

This leaves no doubt as to the identity of *P. granulosa* and *verrucosa*, the former being only the young stage of the latter, as already Bouvier (1896) maintained.

## Family *GALATHEIDÆ* Dana.

### MUNIDA Leach.

### Munida subrugosa Dana.

1888 *M. s.* Henderson in: Rep. Voy. Challenger, v. 27, p. 124.
1891 *M. s.* A. Milne-Edwards in: Miss. Cap Horn, v. 6, p. 36, pl. 2, f. 2.

*Localities.* — Punta Arenas, 1 ♂ 1 ♀ (ad.); San Julian, 29 jun.

*Distribution.* — Falkland Islands; Tierra del Fuego; Straits of Magellan; along the Atlantic coast of Patagonia northward to off Monte Video; on the western coast northward to Messier Channel and Chiloë.

This species is also found in New Zealand, Auckland and Campbell Islands. A variety (var. *australiensis* Henderson, 1888, p. 125, pl. 13, f. 3) is found in Bass Strait, Australia.

Range in depth: southern localities 0–125 fath.; off Monte Video: 600 fath.

*Remarks.* — The specific differences of this species have been set forth best by A. Milne-Edwards, and I have been able to verify them in our material.

Henderson's *M. subrugosa* is the true *M. subrugosa*, although he also gives, among the synonyms, *Grimothea gregaria* (with a ?): he states expressly (p. 125) that no specimens representing the latter form were taken by the Challenger, and, further, he doubts the correctness of the identification of these two species.

### Munida gregaria (Fabricius).

1891 *M. g.* A. Milne-Edwards in: Miss. Cap Horn, v. 6, p. 32, pl. 2, f. 1.
1902 *M. g.* Benedict in: Proc. U. S. Mus., v. 26, p. 308, fig. 45, 46.

*Locality.* — Punta Arenas, 1 ♂ ad.

*Distribution.* — Falkland Islands; Tierra del Fuego; Straits of Magellan.

It is doubtful whether this species is also found in New Zealand, since it has been confounded by some authors with *M. subrugosa.* A form allied to this is mentioned by Filhol (1885, p. 426) from Cook Strait, New Zealand: he distinguishes it well from *M. subrugosa*, but says that it is also not quite identical with "*Grimothea gregaria*," and proposes the name of *Grimothea novæ-zelandiæ* for it. See also Benedict, l. c.

*Remarks.* — Length of body of our specimen: 54 mm. (about as long as Milne-Edwards' adult male). It agrees well with the description in every respect, but the spinules of the upper part of the carapace are less distinct, although present. The latter character seems to be not very important, since a variety of *M. subrugosa* (var. *australiensis*) also possesses a larger number of spinules on the carapace than the typical *subrugosa*.

## Family *MAJIDÆ* Alcock.

### EURYPODIUS Guérin-Méneville.

### EURYPODIUS LATREILLEI Guérin-Méneville.

1891 *E. l.* A. Milne-Edwards in: Miss. Cap Horn, v. 6, p. 10.

*Localities.* — Punta Arenas, 1 ♂ ad. 15 ♂ jun., 1 ♀ ad. 4 ♀ jun.; Mount of Observation (near Santa Cruz) 1 ♂ ad. 2 ♀ jun.; Mouth of Santa Cruz River, 2 ♂ 1 ♀ (all jun.); San Julian, 1 ♀ jun.

*Distribution.* — Falkland Islands; Tierra del Fuego; Straits of Magellan; northward, on the western coast, to Chili and Peru, and on the eastern coast to the Gulf San Matias (Rathbun, Pr. U. S. Mus., v. 21, 1898, p. 571). 0–70 fath.

*Remarks.* — Our series corresponds exactly to the account given of this species by A. Milne-Edwards, showing the identical differences of the characters in the different sexes and ages.

## Family *HYMENOSOMIDÆ* Stimpson.

### HALICARCINUS White.

### HALICARCINUS PLANATUS (Fabricius).

1852 *H. p.* Dana, U. S. Expl. Exp., v. 13, p. 385, pl. 24, f. 7.
1852 *H. pubescens* Dana, ibid., p. 386, pl. 24, f. 8.
1886 *H. plan.* Miers in: Rep. Voy. Challenger, v. 17, p. 281.
1891 *H. pl.* A. Milne-Edwards in: Miss. Cap Horn, v. 6, p. 27.
1900 *H. pl.* Stebbing in: Proc. Zool. Soc. p. 524, pl. 36, *B.*

*Localities.* — Punta Arenas, 6 ♂ ad. and half grown, 3 ♂ jun., 10 ♀; Mount of Observation, 1 ♀; Mouth of Santa Cruz River, 14 ♀; San Julian 1 ♂ jun., 7 ♀.

*Distribution.* — Falkland Islands; Tierra del Fuego; Straits of Magellan. It has been found, on the east coast of Patagonia, at Cape Virgin (entrance of Straits of Magellan), and at Cape Blanco (47–48° S.); on the western coast it seems to extend to Chili.

This species has been recorded from New Zealand, Auckland Islands, Kerguelen Islands, Marion and Prince Edwards Islands. Range in depth: 0–150 fath.

On the Australian coast it is represented by the very closely allied species: *H. ovatus* Stps. (see Stebbing, l. c.).

*Remarks.*—The young ♂ from San Julian, and the three young ♂ from Punta Arenas, of the lengths: 2.5–3–3.5–4 mm., agree completely with Dana's *H. pubescens*, which is said to be one tenth of an inch long (= 2–3 mm.): the form of the carapace is more rounded (less transverse than in *H. planatus*), the walking legs (and sometimes the carapace) are slightly pubescent, and the sides of the male abdomen are parallel, with the exception of the last joint. A young ♂, 6 mm. long has the typical form of the male abdomen of *H. planatus*, but the form of the carapace is less transverse. The pubescence is not present. Larger males (from 10 mm. upward) acquire by degrees the greatly swollen chelipeds. Our largest male has the following measurements: Length 13 mm., width 16 mm.

## Family *ATELECYCLIDÆ* Ortmann.

### HYPOPELTARIUM Miers.

### Hypopeltarium spinosulum (White).

1886 *Hypopeltarium spinosulum* Miers in: Rep. Voy. Challenger, v. 17, p. 211.

1891 *Pelterion spinulosum* (sic) A. Milne-Edwards in: Miss. Cap Horn, v. 6, p. 17.

1900 *Peltarion spinosulum* Stebbing in: Pr. Zool. Soc., p. 519.

*Locality.* — Punta Arenas, 3 ♂, 17 ♀, 19 jun.

*Distribution.* — Falkland Islands; Tierra del Fuego; Straits of Magellan; Chiloë; Chili; Valparaiso; Gulf San Matias, Argentina. 0–45 fath.

*Remarks.* — The specific name *spinosulum* was used by White in 1843, *spinulosum* by the same author in 1847; the latter form was accepted by all subsequent writers except Miers (1886) and Stebbing (1900).

The generic name *Peltarion* Jacquinot is correctly to be transcribed as *Peltarium*, and this is preoccupied; it has, therefore, to give way to *Hypopeltarium* Miers.

A. Milne-Edwards describes the rostrum of this species as bifid with two lateral teeth: in most of our individuals, however, it is three-spined, the median spine being entire; only in rare cases there is a slight emargination or notch at its distal extremity.

## ZOÖGEOGRAPHICAL REMARKS.

Among the *marine forms* collected by Mr. Hatcher, four groups are distinguishable according to their geographical range:

1. *Cosmopolitan.*
   *Lepas anatifera* L.
2. *West American* (California to Patagonia).
   *Balanus lævis* Brug. (also in the Atlantic, northward to southern Brazil).
3. *Antarctic types.*
   1. *Iais pubescens* (Dan.), also: S. Georgia, New Zealand, Tasmania, Kerguelen.
   2. *Exosphæroma gigas* (Leach), also: New Zealand, Auckland, Australia, Kerguelen.
   3. *Cymodocea darwini* Cunn., also: Kerguelen.
   4. *Dynamene eatoni* Mrs., also: Kerguelen.
   5. *Cassidina emarginata* M.-E., also: S. Georgia, Kerguelen.
   6. *Munida subrugosa* Dan., also: New Zealand, Auckland, Campbell, Australia.
   7. *Halicarcinus planatus* (F.), also: New Zealand, Auckland, Kerguelen, Marion, Prince Edward.
4. *Local types*, restricted to so called Magellanian province.
   1. *Elminius kingi* Gr.
   2. *Edotia tuberculata* Guér.
   3. *Rocinela australiensis* Sch. & Mein.
   4. *Exosphæroma lanceolatum* (Wh.).
   5. *Serolis paradoxa* (F.).
   6. *Lithodes antarctica* Jacqu.
   7. *Paralomis granulosa* (Jacqu.).
   8. *Munida gregaria* (F.).
   9. *Eurypodius latreillei* Guér.
   10. *Hypopeltarium spinosulum* (Wh.).

We see at once that, while the prevailing features of the southern Patagonian marine fauna are made up chiefly by peculiar species, another large part of the fauna shows unmistakable affinities to other Antarctic countries. Looking more closely upon the peculiar types (group 4), we are able to state the following particulars with regard to their relationship to other parts of the world.

The genera *Elminius*, *Edotia*, and *Eurypodius* do not find any closer relations elsewhere. *Exosphæroma* and *Serolis* are distinctly Antarctic types, while the affinities of *Rocinela* and *Munida* are more or less cosmopolitan. There remain only the two *Lithodidæ* and *Hypopeltarium*. The *Lithodidæ* apparently are to be classed with those forms which possess a kind of bipolar distribution, but where the two polar areas are connected along the western coast of America. This has been called by the present writer "meridional distribution,"[1] and such cases are not considered to belong to "bipolarity" in the original sense. *Hypopeltarium*, which is represented in European waters by *Atelecyclus*, might be taken for a case of bipolarity, if it were not for the fact that a species of this genus lately has been discovered in the West Indian region.[2] This renders it impossible to regard this case (of *Hypopeltarium* and *Atelecyclus*) as one of bipolarity.

Examining the Antarctic types (group 3), we find that none of them can be regarded as a representative of any characteristic Arctic form, although among the five isopods the generic affinities need further investigation. This much is known, that all five of them are hardly represented in any part outside of the Antarctic regions. The same is true of *Halicarcinus*, while *Munida*, as has been stated above, is cosmopolitan.

Thus, among the forms discussed here, the bulk is to be regarded as peculiar to this region, representing a local Magellanian fauna. A large part of this fauna exhibits characteristic Antarctic affinities, pointing to a former closer connection of the different parts (South America, New Zealand, Australia, Kerguelen, etc.). The remaining small number represent either immigrants from the north, along the western coast of America, or more or less cosmopolitan types.

The Magellanian fauna, according to this material — and this is no doubt a fair representation of the more abundant forms of it — is descended from a general Antarctic fauna, which has developed some peculiar local types; a few elements of it (*Elminius*, *Edotia*, *Eurypodius*) seem to be altogether peculiar to these parts, while a few others belong to different sources; some immigrated from the north, and others are cosmopolitan forms, the original home of which cannot be traced. No indications of bipolarity are found, that is to say, in no case are the affinities of any of these Antarctic forms to Arctic forms closer than to any other region of the earth.

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[1] See Ortmann in Zool. Jahrb. Syst., v. 9, 1896, p. 584, and Bronns Klass. and Ordn. d. Thierreichs, v. 5, Crust., 1900, p. 1279; see also Bouvier, 1896.

[2] *H. dextrum* Rathbun in: Bull. Labor. Univ. Iowa, 1898, p. 277 (from Yucatan).

This points distinctly to the former existence of an Antarctic fauna peculiar to the shores of the supposed old Antarctic continent, of which fauna the Magellanian is a slightly modified offshoot, blended with a few types of different, presumably northern, origin and the view is supported that the Antarctic fauna, in its origin, is totally different from the Arctic.[1]

With regard to the *fresh-water fauna* we may make the following remarks.

Most of the species recorded here belong to the class of those small fresh-water organisms, for which exceptional means of dispersal (passive transport by wind, water-fowl, etc.) are admissible, and even observed, so that a more or less cosmopolitan distribution is not astonishing. Although most of the species (except *Daphnia hastata*) are peculiar to Patagonia, the genera are universally distributed.

A very remarkable exception to this is presented by the Copepod genus *Pseudobœckella*. The distribution of this and the allied genera (*Bœckella*, *Bœckellopsis*, *Parabœckella*) is almost exclusively restricted to the Antarctic countries (only in S. America the range extends into Brazil). I give here a synopsis of the known localities, following Mrazek's (1901) classification.

The genus *Bœckella* (typ.) Mraz. contains three species from Australia and New Zealand (*B. triarticulata* (Thoms), *minuta* Sars, *robusta* Sars). To these we have possibly to add: *B. gracilipes* Dad., *gracilis* (Dad.) and *pygmæa* Dad., from Patagonia and Chili.[2]

*Pseudobœckella* Mraz. contains the following species: *brasiliensis* (Lubb.), Patagonia and Brazil; *poppei* Mraz., S. Georgia and S. Patagonia; *longicauda* (Dad.) and *entzi* (Dad.) both from Patagonia; and probably also: *dubia* (Dad.) and *silvestrii* (Dad.) from Patagonia.

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[1] See Ortmann in Proc. Americ. Philosoph. Soc., v. 41, 1902, p. 399, footnotes.

[2] Daday in Term. Füz., v. 25, 1902, p. 444.

*Bœckellopsis* Mraz. possesses only the species *B. bergi* (Rich.) from Buenos Aires and S. Patagonia.

*Parabœckella* Mraz. is made up of *P. brevicaudata* (Brad.) from Kerguelen and Punta Arenas.

This distribution is so remarkable, including only S. America, S. Georgia, Kerguelen, Australia and New Zealand, that this group of genera, which are no doubt closely related to one another, clearly is to be classed with those freshwater and land animals that point to a former connection of these regions.[1] Under the same head comes also *Lepidurus hatcheri* Ortm., of which we have demonstrated above, that it is most closely allied to *L. angasi* Baird of South Australia.

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[1] Ortmann in Proc. Americ. Philos. Soc., v. 41, 1902, p. 335 ff.

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## PART VII.

# HIRUDINEA OF SOUTHERN PATAGONIA.

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NOTHING whatever was known of the fresh-water leech fauna of the extreme southern end of South America—of the entire region south of Valdivia on the Pacific coast and of Montevideo on the Atlantic side—until the publication in 1890 of Blanchard's account of the leeches collected by Dr. Michaelsen on the Hamburg Expedition to the Straits of Magellan. In this paper the following species were described from Tierra del Fuego and Punta Arenas on the Straits of Magellan, all having been collected at no great distance from the coast in ponds, lakes and swamps: *Semiscolex variabilis* Blanchard, *Glossiphonia* (*Helobdella*) *chilensis* Blanchard, *Glossiphonia* (*Helobdella*) *michaelseni* Blanchard, and *Glossiphonia* (*Helobdella*) *scutifera* Blanchard.

The material described in the present paper was collected inland along the base of the mountains at elevations as high as 2,500 ft., and particularly from the numerous springs and streams which feed the Rio Chico—a region from which no leeches have hitherto been described. As regards the number of species the collection is small, comprising but six, belonging to only two families. But several of these are represented by a great many examples. Three of the four species recorded by Blanchard from southern Patagonia are represented; and two new species are included, both of which possess functional nuchal glands, which in *Glossiphonia duplicata* are greatly developed. So far as appears in the present very incomplete state of our knowledge of the fresh-water leeches of this region, the most striking feature of the fauna is the predominance of small glossiphonids of the group designated by Blanchard *Helobdella*. Including *G. stagnalis*, which has been found as far south as Valdivia, this fauna includes most of the known species with functional nuchal glands.

## SEMISCOLEX.

### SEMISCOLEX VARIABILIS R. Blanchard.

(Plates XLIX, Figs. 1–9; L, Fig. 12.)

Except for the narrower prostomium and smaller mouth, the general aspect is similar to *Hæmopis*, a resemblance which is especially striking in the case of a quite small individual. The larger specimens are somewhat flattened posteriorly and rather sharply constricted at the region of the sexual pores, anterior to which the body is narrower and nearly terete. The arrangement of the eyes is shown in figures 1 and 7. The relative position of the pigment cups and the direction of the axes of the eyes are sufficiently obvious. The pigment cups of the first three pairs are larger and more conspicuous than the others. No sensillæ are discernible.

Sixteen pairs of quite conspicuous nephridial ducts, appearing as short tubes which pass obliquely backward through the integuments, open close to the posterior margin of annulus *b2* of every somite from IX to XXIV. The anus is a conspicuous opening with lobed margins as in *Hæmopis*.

Like Blanchard's types all three of the specimens studied by me have the male genital orifice situated in the middle of XII *b1*. In the mature examples it is a rather prominent four-rayed opening, slightly elevated on a broad, low papilla, to support which the annulus is lengthened mesially. In all three of Blanchard's specimens the position of the female pore differed, ranging from XII *a2/b5* to XII *b6*, being separated from the male pore, therefore, by two and one half, three and one half and four annuli respectively. The intermediate condition was exhibited by an example from Punta Arenas, Patagonia, and to this the three here described are exactly similar. The female pore in all is a minute opening in a depressed area situated at XII *b5/b6*.

*Annulation.*—The details of annulation of the best preserved mature example are exhibited in Plate XLIX, figs. 2, 3, 5–8, and of the young example in figure 4.

Somites I, II, III and IV are separated by no distinct furrows, though slight wrinkles may be caused to appear on the median part of the head between the eyes by bending this region upward. These furrows, together with the position of the closely crowded anterior three pairs of eyes, show that the first three somites are uniannulate. Somite IV is apparently so also, or else *a3* is very obscurely distinct, for, although the distance between the third and fourth pairs of eyes is somewhat greater than that separating any of the preceding pairs, no distinct intervening annulus can be detected.

V is biannulate; the two annuli — $(a1 + a2)$ and $a3$ — are of about equal length. The pigment cups of the fourth pair of eyes are at about the middle of the anterior annulus and placed on the antero-internal face of the sensory cells. The furrow $(a1 + a2)/a3$ is incomplete in the small specimen and the pigment cups of the eyes reach into IV, an appearance due in part to contraction and in part to the position of the head when drawn.

VI is also biannulate. On the dorsal surface a faint furrow $(a1/a2)$ is present, extending about as far as the eyes in the larger example, but detectable under the compound microscope for the entire width of the head of the smaller one. The pigment cups of the fifth pair of eyes, which cover the anterior face of the sensory cells, lie directly beneath this incipient furrow. The second annulus $(a3)$ is quite distinct all around, making the somite biannulate ventrally as well as dorsally.

VII is triannulate; $a3$ is distinctly longer than $a1$ or $a2$ which are obviously more closely associated, the furrow $a1/a2$ being less distinct than $a2/a3$, especially on the ventral surface.

VIII is quadriannulate. Of the four annuli $a1$ is just appreciably longer than $a2$ and shows a faint dorsal furrow, $b1/b2$; $b5$ and $b6$ are distinctly shorter than $a1$ and $a2$, and the furrow $b5/b6$ is a trifle less deep than the others.

There are sixteen distinctly quinqueannulate somites, IX to XXIV inclusive. In IX the relative lengths of the annuli are represented by the formula $b1 = b2 < b5 = b6 < a2$; IX $b1$ and $b2 =$ VIII $b5$ and $b6$. By about XI the formula becomes $b1 = b2 = b5 = b6 < a2$, which it remains until about XXII where the somites begin to decrease in relative and absolute length, owing to diminution of the posterior annuli. Here $a2 > b1 = b2 > b5 = b6$.

XXV is quadriannulate, $b1$ and $b2$ being smaller than $a2$, which is again slightly smaller than $a3$. Across the latter, traces of the furrow $b5/b6$ may be detected. Following XXV are two small rings between which the anus is placed. Although there are no visible sensillæ to authenticate the determination, these are interpreted as XXVI and XXVII respectively.

The small specimen shows immaturity not alone in the condition of the reproductive organs, but in the external annulation. Throughout the middle region of the body the secondary annuli into which *a1* and *a3* are divided are imperfectly separated. This is expressed not so much in their relative size, which is scarcely appreciably less than in the mature specimen, but very obviously in the relative shallowness of the furrows *b1/b2* and *b5/b6* as compared with *b2/a2* or *a2/b5*. Figure 4 is a careful camera drawing of the ventral surface of this specimen when mounted in glycerine, in which medium the ganglia can be seen quite clearly and are also represented in the figure. Generally the ganglia lie principally within *a2* throughout the quinqueannulate region. The subœsophageal complex is in VI and VII and the supraœsophageal chiefly in VI. On the dorsal surface the furrow *a2/b5* is distinctly deeper than *b2/a2*, resulting in the natural division of the five annuli into two groups of three and two respectively.

*Alimentary Canal.*—The upper lip (prostomium) is somewhat wrinkled below, but lacks any definite and distinct median sulcus. The mouth is small in the preserved specimens, scarcely larger than in a nephelid in the larger, but relatively larger in the smaller one. Jaws are absent, though the median dorsal one is probably represented by a small rounded tubercle occupying the corresponding position and surrounded by a shallow trench, immediately laterad to which is a pair of broad, low, longitudinal muscle columns, and again beyond these a similar pair of narrower ones, but no trace of lateral jaws. Muscles and gland ducts enter the dorsal tubercle, but there are no teeth. A low, narrow fold passes between the buccal chamber and pharynx dorsally, but fades out ventrally.

The pharynx (Plate XLIX, fig. 9) is capacious and extends to the region of the genital pores in the middle of XII. Its inner surface is thrown into slightly marked longitudinal muscular ridges. These begin anteriorly as a dorsal pair and a median ventral one, alternating with three much narrower ones. Each of the larger set almost immediately divides into several, so that for the greater length of the pharynx ten or twelve ridges are recognizable. None of these is strongly marked and the internal surface of the pharynx is nearly smooth and regular, but shows a slight tendency toward a triangular section.

A stomach of very simple character extends from XIII into XIX, where it passes, without any very sharp demarkation, into the intestine. Seven valves, which correspond in position to the preganglionic muscular sheets, divide it into as many slight sacculations, the posterior ends of the last of which are produced into a pair of quite rudimentary cæca, of such small size and so closely embracing the intestine that they were entirely overlooked upon the first examination. They scarcely extend beyond the limits of the neural annulus of XIX.

The intestine is somewhat distended with food, to which, in contrast to the emptiness of the stomach, the somewhat greater diameter of the former is probably due. Its walls are excessively thin and delicate and somewhat regularly, but slightly, sacculated for the anterior half. It reaches to XXIV, beyond which a short rectum extends to the anus. That this species is not a habitual blood-sucker, but, like our common *Hæmopis marmoratus*, subsists chiefly on small invertebrate animals and the organic contents of mud, is shown by the contents of the intestine and stomach, which consist of remains of tubificid worms, rhabdocœle planarians and diatoms.

*Reproductive Organs.* — The reproductive organs (Plate L, fig. 12), while approaching in character most closely those of *Hæmopis*, yet exhibit, if the single example dissected be entirely normal, a number of striking peculiarities. The pairs of testes occupy the interganglionic intervals from XIV/XV to XXII/XXIII ventrad of the alimentary canal. The first pair presents the ordinary appearance, but the remaining eight are all double, two closely appressed but perfectly distinct spheroidal testes with separate efferent ducts occupying each interval. The actual number of testes is, therefore, at least seventeen pairs and, as the vasa deferentia extend some distance posterior to the last, it is probable that additional material would permit of the demonstration of at least one more pair; and a pair may also occur at XIII/XIV. Both the vasa efferentia and vasa deferentia are excessively slender, but the latter in particular are rendered very conspicuous by a thick covering of pear-shaped groups of gland cells, which are far more thickly clustered dorsally than ventrally. Anterior to the testicular region the glands diminish in number and disappear altogether in somite XII. At the same time the walls of the sperm duct acquire greater firmness and it may be traced as a tortuous tube as far forward as the position of the male pore, where it bends mesially in a recurrent limb.

In somites XIV and XV each vas deferens becomes converted into a closely coiled, twisted and massed tube with thick walls and of irregular diameter, the epididymis. This passes, without any enlargement into a special sperm sac, into a short thick ductus ejaculatorius which, without any apparent change in its diameter, is lost at once in the substance of the prostate region of the atrium, into which it enters. The atrium is straight — not bent on itself — and is chiefly remarkable for the great size of its prostate region, which projects freely caudad beyond the point of entrance of the ducts for a distance equal to more than one-fourth of the entire length of the atrium, and reaches beyond ganglion XIX. This entire region is covered with a layer of prostate glands. Anterior to the ducts the atrium becomes a thick-walled muscular tube (the penis sheath) which is much narrower than the prostate region and tapers somewhat to the external end. It is unfortunate that no material was available for sectioning to throw light upon the structure especially of the prostate end of the atrium.

The female organs (Plate L, fig. 12) consist of a single ovary (that of the left side being probably abnormally absent) lying in the posterior part of somite XII. The right oviduct (the left being absent) enters a well-marked glandula albuginea, within which it is somewhat coiled. It emerges as the common oviduct, which is not very clearly differentiated from the glandula, and enters the posterior end of the vagina, which is somewhat enlarged but lacks a distinctly separated ovisac at this point. The entire female organ is sharply bent on itself at the point where the oviduct passes into the vagina or uterus. The nerve cord passes to the left of the terminal end of both atrium and vagina.

In following Blanchard in placing this species in *Semiscolex*, I have simply accepted his determination, as I have never had the opportunity of dissecting any other species of that genus, and Kinberg's description is itself insufficient. Verrill's *Semiscolex grandis* and Forbes' *Semiscolex terrestris* are very different and both are true species of *Hæmopis*, though the absence of teeth in the former may be considered by some as a sufficient basis for generic separation. *Semiscolex variabilis* also evidently stands with *Hæmopis* in the distichodont division of the Hirudinidæ, for, although the alimentary canal differs from that of *Hæmopis* and resembles such a nephelid as *Trocheta* in the rudimentary jaws, valvular stomach and all but absent cæca, it has the proportions of and can readily be derived from that of *Hæmopis*. The reproductive organs resemble the latter genus in the length of the vagina and penis sheath, the enlarged prostate, etc., though in the absence of any special sperm and ovarian sacs on the ducts it rather approaches *Hirudo* and its allies.

*Semiscolex variabilis* appears to be a small leech. Blanchard's specimens varied from 10 to 37 mm. in length. The smallest example here described measures 8 mm., the largest, which is poorly preserved, about 23 mm., and the individual which furnished most of these notes and is represented of natural size in fig. 1 has the following measurements.

| | |
|---|---|
| Length, | 21 mm. |
| Anterior end to male pore, | 6.5 mm. |
| Width at male pore, | 2.1 mm. |
| Greatest width (XX), | 3.6 mm. |
| Diameter of posterior sucker, | 1.3 mm. |
| Depth at male pore (about), | .8 mm. |
| Greatest depth (about), | 1.4 mm. |

Two specimens come from a "large spring 30 miles above Sierra Oveja, Rio Chico, Feb., 1899," Station 22; the third is from a "drying-up pool near Arroyo Eke, Alt. 2100 ft., Feb., 1899," Station 43.

### GLOSSIPHONIA DUPLICATA sp. nov.

(Plates XLIX, Fig. 10; L, Figs. 16–22.)

This species resembles *G.* (*Helobdella*) *scutifera* R. Blanchard, but is readily distinguished by the distinctly double annuli, the form of the nuchal plate, the metameric color pattern, etc.

Without exception all of the very large number of preserved specimens are stout and thick, less wide and flattened, but much deeper and more strongly convex dorsally than examples of *G. scutifera* preserved in the same bottles. The anterior end is somewhat slender, the posterior broadly rounded, the greatest width being at about the beginning of the posterior third. The anterior sucker is small, with a contracted opening and thick margin; the prostomium prominent. In almost all of the specimens a low elevation arises from the middle of the sucker, with a deep groove bounding it anteriorly. The mouth is rather large, situated in a thickening which represents the ventral portion of somite III, and is the center of several radiating furrows (Plate L, fig. 18).

The contracted, thick-rimmed posterior sucker is so strongly directed ventrad that it is entirely concealed from above (Plate L, figs. 19 and 20).

Following are the measurements of the type specimen, than which some examples are several millimeters longer, as well as relatively deeper.

| | |
|---|---|
| Length, | 18 mm. |
| Length to male pore, | 5 mm. |
| Diameter of anterior sucker, | 1 mm. |
| Diameter of its opening, | .6 mm. |
| Diameter of posterior sucker, | 2.5 mm. |
| Diameter of its opening, | 1.5 mm. |
| Width of body at male pore, | 3.8 mm. |
| Depth at male pore, | 2.4 mm. |
| Greatest width (XIX), | 6 mm. |
| Depth at XIX, | 4 mm. |
| Width at anus, | 2.5 mm. |
| Depth at anus, | 1.2 mm. |

*Annulation.*—Somites I and II are found in the preocular lobe, across which a very faint furrow can usually be detected and is always quite evident in the larger specimens. III is biannulate, the first annulus larger. IV is also biannulate, the anterior annulus bearing the single pair of eyes, which are generally lightly pigmented and consequently inconspicuous. This somite is usually a trifle longer than III, but in some examples they are equal. The example figured is slightly abnormal, the left half of the furrow IV/V being displaced on the dorsal side. V is likewise biannulate, but is considerably longer dorsally, where the enlarged anterior annulus is quite distinctly subdivided by a furrow, which separates a smaller *a1* from a larger *a2*. This furrow ends at the margins of the lips so that ventrally there is no trace of this subannulation (Plate L, figs. 17, 18 and 22).

Although VI must be reckoned as a triannulate somite both above and below, it does not show the typical condition, inasmuch as *a1* and *a2* are rather closely united on the ventral side, and *a3* is the only annulus which exhibits any trace of that development of secondary annuli which is so characteristic of this species among its close allies, and even this trace is usually wanting.

Somite VII is the first typical one. The three annuli are of about equal size and each is usually distinctly subdivided into two nearly equal secondary rings by a cross-furrow, which is especially well-marked on *a1* and *a3*, and much less distinct or even absent ventrally. These cross-furrows correspond in position with superficial annular lacunæ which encircle each primary ring of the complete somites, and they have a constant relation to the bands of circular muscles. Each primary annulus possesses five of these bands, between the second and third of which the furrow passes on *a1* and between the third and fourth on *a2* and *a3*. VII *a3* is somewhat swollen at the mid-dorsal line, where also the furrow VII/VIII may become obliterated for a short distance owing to the development of the nuchal gland on the succeeding somite. The nuchal plate may sometimes slightly overlap VII *a3*, or the latter may be somewhat constricted mesially by the glandular swelling. In some examples the cross-furrows are not visible on VII and they are always less distinct than on the larger annuli of VIII and succeeding somites.

VIII is chiefly remarkable from the presence of the nuchal gland. This is confined to *a1*, which, as a consequence, is swollen and more or less elongated in the median dorsal region. The horny plate secreted by the gland, which it covers like a scale, is remarkably thick and conspicuous. In color it has a very dark brown center and a paler border. Unlike *G. stagnalis* it is broader than long, anteriorly very convex, posteriorly slightly convex or straight. It slightly overlaps or just reaches VIII *a2* and just reaches the furrow VII/VIII anteriorly. But little change is noticeable in the character of the somites to XXIII inclusive, though the secondary furrows are frequently more distinct on the somites immediately succeeding the region of the genital pores.

On XXIV, which remains triannulate, the secondary furrow is present on *a1* only and even there has become less distinct. On the ventral side the annuli of this somite are crowded together by the posterior sucker. XXV is biannulate and of much reduced length. The first annulus is about one half larger than the second and about equal to the contiguous annulus of XXIV. XXVI is faintly biannulate, *a3* being very narrow and indistinct. XXVII is uniannulate and is cut into two halves by the anus, which thus lies just posterior to XXVI (Plate L, figs. 19, 20 and 21).

*Pigmentation.* — From many of the specimens the pigment had faded altogether, but all of those in which this is not the case show a very evident metameric arrangement, resulting in many cases in a strongly annular pattern, which is dependent on the disposition of the muscles. In a typical example (Plate L, fig. 17) the ground color is a faintly mottled, very pale brown, which deepens on the margins and fades to a gray on the ventral surface. Dorsally, two broad, ill-defined, longitudinal bands extend nearly the entire length. They are indistinct anterior to the nuchal gland but are usually conspicuous from that point to the anus. The median interspace between the bands corresponds to nine longitudinal muscle bundles, the bands themselves to five each (they are formed of six lines of pigment cells corresponding to six intermuscular lines), and the distance separating them from each margin to eleven.

Annulus *a1* of each somite from VI to XXVI inclusive is much more heavily pigmented than the others, and the pigment is especially aggregated on its posterior half, the *b2* constituent. Thus in such typical cases, the dorsum is marked by well-defined, narrow, metameric, transverse bands, which become fainter anteriorly, where they can seldom be traced beyond VI, and altogether diffuse posteriorly on XXV and XXVI. These transverse bands extend the entire width of the dorsum, both mesiad and laterad of the longitudinal stripes. Other examples are less typical and show the pigment spreading over *a3* as well as *b1*, but the former never becomes so dark and is brown rather than blackish; *a2* always remains paler. The characteristic pattern is due to black pigment cells deep-seated between the muscle bands.

*Reproductive Organs.*—The male pore is situated at XII *a1/a2*, the female at XII *a2/a3*. The former is the more conspicuous, and in some specimens, but not in the type, is in the center of an elliptical disc, which is wedged between the two contiguous annuli. There are six pairs of testes (Plate XLIX, fig. 10) of globoid form alternating with the gastric cæca and filling up the spaces between these. Dorso-ventrally they are deeper than the cæca, reaching the same dorsal level, but extending to a lower ventral one. Though inter-metameric in position, they probably belong to the somites in which their posterior halves lie, consequently to XIV to XIX inclusive. The vasa efferentia and vasa deferentia are excessively delicate and can be traced only with difficulty. The vas deferens of each side passes dorsad of the cæca and mesiad of the testes. Reaching the posterior end of XII, it bends sharply mesiad, traversing muscles and pharyngeal glands ventrad to the ducts of the latter, and reaches the ventral sinus, through which it extends caudad, increasing, first abruptly and then gradually in diameter. The change from the minute vas deferens to the larger epididymis takes place in XIII. The long epididymal loop (sperm sac) thus formed is very conspicuous, reaching to the posterior end of XIX, and, being considerably convoluted and coiled about its fellow, would if straightened out, have a total length somewhat greater than the entire animal. The external limb of the loop has a slightly larger and more uniform diameter than the internal and its walls have a firmer consistency, which increases as the muscular structure of the ductus ejaculatorius is assumed. The difference however is slight. In one specimen the left epididymal loop passes ventrad to the right lateral nerve of XIX and then bends forward dorsad to the nerve cord and reaches to ganglion XVIII. Just before entering the prostate or atrial cornu, the duct becomes constricted for a short distance. The atrium consists of a very small common bursa, opening to the exterior and situated entirely beneath the nerve cord, and of two large globoid-fusiform or broadly ovate cornua, which diverge from beneath the nerve cord and project prominently cephalad, laterad and dorsad within the limits of somite XII. Their somewhat narrowed apices are joined by the sperm ducts (Plate XLIX, fig. 10).

The ovarian sacs (Plate XLIX, fig. 10) have no anterior lobes (or at least none are discernible in several dissections) and the two simple sacs of irregular form lie in close contact in the ventral sinus between the nerve cord and the sperm sacs. In the case where they exhibit the greatest development, the left sac reaches to ganglion XVIII, the right to XVII.

*Alimentary Canal.*—The proboscis (Plate L, fig. 16) is stout, nearly cylindrical but very slightly tapering; the anterior end is but little contracted and truncate with fine denticulations on the margin. It reaches in the retracted state from VII *a1* to XII *a3* and receives at its slightly enlarged base the pair of thick ducts of the pharyngeal glands. These are a loose, diffuse mass of unicellular glands occupying on each side the lateral portions of somites XII to XIV and to a less extent of XI. There is no median lobe and the bundles of ducts from each side remain independent of each other. A short, thin-walled œsophagus extends through XIII to the stomach beginning in XIV.

The stomach is thin-walled throughout and resembles that of *G. lineata* (Verrill) most closely, the cæca being better developed than is usual in *G. stagnalis.* Six pairs of these cæca occur. The first, in XIV, are very small and may be absent on one side, or otherwise asymmetrically developed. In XV to XVIII are four pairs of slender cæca of simple form, which (when empty) extend nearly half way to the margins of the body. The pair of large, posteriorly directed ones arises in XIX and extends to XXIV inclusive. The intestine has the usual four pairs of lateral cæca in XX to XXIII inclusive, all of which are dorsad of the large gastric cæca. The first three pairs are sacculated, the last smooth. Each of the gastric and intestinal cæca arises directly over the corresponding ganglion and, with the exception of the last gastric, is confined to the limits of one somite.

This species must be exceedingly abundant throughout the region of Mr. Hatcher's explorations, as the following list of the localities and number of specimens will show.

Station No. 7. "Small running stream south side of Rio Chico, 25 miles above Sierra Oveja, Feb., 1899." 1 specimen.

Station No. 8. Spring at the same locality. 12 specimens.

Station No. 11. "Small running stream south side of Rio Chico, 15 miles above Sierra Oveja." 11 specimens.

Station No. 17. "Small stream running from spring on Rio Chico, 25 miles above Sierra Ventana, Feb., 1899." 8 specimens, one of which bears eggs.

Station No. 25. "Spring on Rio Chico, 15 miles above Sierra Oveja, Feb., 1898." 1 specimen.

Station No. 36. "Spring on Rio Chico, 30 miles above Sierra Oveja, Mar., 1898." 24 specimens.

Station No. 38. "Spring on Rio Chico, 25 miles above Sierra Ventana, Mar., 1898." 1 specimen.

Station No. 40. "Spring on Rio Chico, 25 miles above Sierra Oveja, Mar., 1898." 6 specimens.

"In spring on Rio Chico." Six small specimens of 6–8 mm. which show the divided annuli distinctly.

### GLOSSIPHONIA SCUTIFERA (Blanchard).

The reproductive organs of *Glossiphonia* (*Helobdella*) *scutifera* are intermediate in character between those of *G. duplicata* and *G. michælseni* in that the vas deferens does not abruptly enlarge to form the sperm sac immediately after turning caudad, as in the former, nor yet retain its tenuity for several somites further back, as in the latter, but passes first into a region of intermediate diameter before again increasing to the full size of the sperm sac. That these differences are constant, seems certain from the verification of the observation in repeated dissections. The ductus ejaculatorius is relatively longer than in *G. duplicata* and frequently makes one or even two turns of a spiral in passing to the prostate cornua of the atrium.

With the exception that the gastric cæca are considerably longer, the alimentary canal differs in no important feature from that of *G. duplicata.*

There is never any appearance of subdivision of the annuli, although the superficial annular lacunæ are developed as in *G. duplicata.* In all of the specimens examined by me the nuchal plate is thin and transversely elongated, sometimes merely occupying a chink between VII *a3* and VIII *a1*.

Blanchard found this species to be very numerous in the collections from the region bordering on the Straits of Magellan. In the uplands it seems to be less frequent than some of its allies.

No. 7. "Small running stream south side of Rio Chico, 25 miles above Sierra Oveja, Feb., 1899." 9 specimens.

No. 19. Large spring at same locality. 2 specimens.

No. 22. "Large spring 30 miles above Sierra Oveja, Rio Chico, Feb., 1899." 35 specimens, some of which are marked by the paired longitudinal dark lines noted by Blanchard.

No. 48. Rio Blanco. 1 specimen.

### GLOSSIPHONIA SIMPLEX sp. nov.

(Plates XLIX, Fig. 11; L, Figs. 15, 23, 24.)

The nearest ally of this species is *Glossiphonia lineata* (Verrill), from which it is distinguished by having somites III and IV uniannulate instead of biannulate, and a single series of cutaneous papillæ present on every annulus instead of three series developed on the neural annuli only, as in *G. lineata.*

*G. simplex* is broad, flat-bodied and thin, in which it contrasts greatly with *G.* (*Helobdella*) *michælseni* R. Blanch., which in annulation and anatomy it closely resembles. The annuli are very distinct, and the margins, especially posteriorly, almost serrated. The oral sucker is small, with thick margins and a rather deeply depressed center, in the anterior part of which the large mouth is situated in somite III. The deeply pigmented eyes are in IV and are very conspicuous, owing to their large size and the nearly color less areain which they lie. A median, slightly enlarged area on annulus VIII *a1* represents a small nuchal gland, but there is no nuchal plate, except in two specimens, in which it is very thin and of nearly the form shown by *G. scutifera.* The posterior sucker is relatively larger than in *G. michælseni* and, unlike that species, faces ventrad and extends further forwards. At the same time its posterior margin is widely exposed from above. Its surface is roughened with numerous minute papillæ (Plate L, fig. 24). A somewhat irregular series of small cutaneous papillæ passes along the median dorsal line, usually occurring on every annulus from the genital somite nearly to the anus. Anterior to the genital pores they usually fade out and may be absent from several of the preanal somites also. These papillæ form a strictly median series, not a broken double series as in *G. lineata.* They have a nearly constant relative size on the three annuli of a somite, being longest on *a2* and smallest, and sometimes even wanting on *a1*.

### MEASUREMENTS OF TYPE.

| | |
|---|---|
| Total length, | 9 mm. |
| Length to male pore, | 2.5 mm. |
| Diameter of anterior sucker, | 6 mm. |
| Diameter of posterior sucker, | 1.2 mm. |
| Width of body at male pore, | 2 mm. |
| Depth at male pore, | .6 mm. |
| Greatest width (XVIII), | 3.7 mm. |
| Depth at XVIII about, | .8 mm. |

*Annulation.*—I and II are coalesced. III and IV are uniannulate, the latter containing the eyes. V is biannulate, the first annulus about as long as the entire somite IV, the second (*a3*) about three fifths as long. The furrow V *a1*/*a2* is sometimes faintly developed. VI is triannulate, *a2* generally, but not invariably, the longest.

The annuli of the complete somites, of which there are nineteen (VI to XXIV), have, with the exception of the first and the last, which may vary, a constant relative size; *a2* is the longest, *a1* the shortest; *a1* has four circular muscle-bands on the dorsal side, *a2* and *a3* have each five, except that in most cases XXIV *a3* has but four. XXV is biannulate both dorsally and ventrally. XXVI and XXVII are uniannulate, the latter deeply cut by the large anus. One distinct postanal annulus is differentiated (Plate L, figs. 23 and 24).

Unlike most of the material in this collection, which was not suitably preserved for the purpose, many examples of this species exhibit a part of the dorsal sensillæ. In no case could the full number be detected on any one somite and it is possible that the dorso-median series may be wanting. At any rate the pair most median in position are separated by a wide interval, equal to about half the width of the body. Plate L, fig. 24, shows their arrangement on somite XXIV of an individual in which they were especially prominent.

*Pigmentation.* — The color above is a pale brownish, with a broad median dark area (equal to two thirds of the width of the body) marked by twenty-four fine longitudinal lines of black pigment cells, which correspond to as many intermuscular intervals. The two most mesial of these are much heavier than the others and tend to unite across the median line. All of these lines, and consequently the area, tend to fade out both anteriorly and posteriorly. More superficial than the longitudinal striæ are small irregular blotches and transverse dashes which lie between the circular muscles and are more or less thickly scattered over the entire dorsal surface from margin to margin, except anteriorly, where they are very few, and further forward altogether absent. These spots give to the dorsum a speckled appearance not unlike what is seen in many examples of *G. scutifera.* Of course some individuals are lighter, some darker. Many examples have two or three large irregular whitish spots, from which pigment is nearly or quite absent, in the posterior part of the body. A somewhat unusual feature in members of the genus is the presence on the ventral surface of submarginal series of irregular, more or less confluent dark spots, forming a band on each side. They are confined to the middle third of the body.

*Reproductive Organs.* — The genital pores are separated by a single annulus, the male being at XII *a1/a2*, the female XII *a2/a3*. There are six pairs of testes arranged as in *G. duplicata.* The vas deferens is dorsolaterad of the testes and is met by the six delicate vasa efferentia, which arise from the dorso-lateral aspect of the testicular walls. After reaching somite XII the vas bends back into a long epididymal loop as in *G. duplicata*, but, instead of becoming enlarged at once to form the sperm sacs, as in that species, it reaches, without any change in its diameter or the character of its wall, as far caudad as XVI or XVII, at which point it abruptly passes into the sperm sac. The latter may extend as far as XX, and the anterior end of its efferent limb becomes more or less coiled and looped in XII or even extends into XI. The atrium and ductus ejaculatorius exhibit no features requiring special comment, which is true of the ovaries also (Plate L, fig. 15). The collection includes one specimen of 8 mm., bearing eggs arranged in a compact group at the widest part of the body. Others exhibit indications of having recently borne eggs or young.

*Alimentary Canal.*—The pharynx is about as stout as that of *G. lineata*, and when retracted reaches from VIII to XII. Its free end is provided with muscular denticulations. In XIII the thick ducts of the pharyngeal glands open into its posterior end. These ducts are provided with a stout muscular sheath, are single on each side and lack any cross connection. The glands consist of a few cells which are individually of larger size than in *G. duplicata* and are distributed sparingly over somites XI to XV or even beyond. There are usually only five pairs of gastric cæca, the first four of which are simple and of nearly equal size, the fifth, which arises in XIX, is somewhat spacious and reaches XXII. The intestinal cæca are four pairs, alternately larger and smaller, and, with the exception of the last, curve somewhat cephalad above the last pair of gastric cæca (Plate XLIX, fig. 11).

*G. simplex* is represented from the following localities:

No. 5. "Spring on Rio Chico 15 miles above Sierra Oveja." 6 specimens.

No. 14. "Rio Chico, 5 miles above Sierra Ventana, Feb., 1899." 15 specimens, several bearing eggs and young.

No. 22. "Large spring 30 miles above Sierra Oveja, Rio Chico, Feb., 1899." 2 specimens.

No. 38. "Spring on Rio Chico 25 miles above Sierra Ventana, Mar., 1898." 1 specimen.

No. 40. "Spring 25 miles north of Sierra Oveja, Mar., 1898." 2 specimens.

No. 48. Rio Blanco. 2 specimens.

No. 36. "Spring on Rio Chico 30 miles above Sierra Oveja, Mar., 1898." 1 specimen.

"In spring on Rio Chico." 1 specimen.

### GLOSSIPHONIA MICHÆLSENI (Blanchard).

(Plate L, Figs. 13, 14.)

Among the peculiarities of the reproductive organs (Plate L, fig. 14) the following are noteworthy. There are epididymal loops (sperm sacs) formed by the vasa deferentia as in *G. duplicata*, *G. stagnalis*, etc., and usually reaching beyond ganglion XVIII. In one respect they differ strikingly from those of *G. duplicata* and as closely resemble *G. simplex*, viz., the vasa deferentia after turning remain of extreme tenuity until reaching XV or XVI, that is, for about half the length of the loops, and then suddenly enlarge into the sperm reservoirs. This is true of all of a considerable number dissected. Before entering the prostates, the duct is thrown into several deep folds, which extend anterior to the atrium even into somite XI.

In the form of the alimentary canal (Plate L, fig. 13), as indeed in many other respects, this species closely resembles *Glossiphonia nepheloides* (Graf.) (= *G. elongata* Castle), a not uncommon species in Pennsylvania, New Jersey, and Massachusetts. A striking difference in the digestive tract, however, is the entire absence of the large gastric cæca, which in other Glossiphoniæ arise in XIX, and in *G. nepheloides* extend, according to Castle, through two somites.

The mouth, which is of remarkably large size, is in somite III. The pharynx, which, when retracted, reaches from VIII to a point just caudad of the male pore, is stout and may be extended to an unusual distance, in some cases to nearly one third the length of the body. It is nearly cylindrical, but tapers somewhat abruptly at the free end, which is terminated by nine larger muscular denticulations, arranged in three sets of three each and alternating with three smaller ones. Three longitudinal muscular ridges continue these for the entire length of the pharynx and give to its lumen the usual triangular form. They terminate at the point of entrance of the ducts of the pharyngeal glands in XII or XIII. As in most small glossiphonids of the *Helobdella* group, these glands are strictly paired. In this species they consist of a very few unicellular glands of large size arranged in a loose group confined mainly to XII and XIII, though occasionally extending somewhat into the immediately adjacent somites. The ducts are in one pair, of large size and strongly muscular.

A short œsophagus gradually widens into the thin-walled, somewhat spacious stomach which reaches from XIV to XIX inclusive. The stomach increases in diameter to about XVII, behind which a constriction occurs, followed by a rather conspicuous sacculation in XIX, probably representing the posterior gastric cæca which, however, do not extend at all caudad. Indeed there are no distinct gastric cæca whatever. Four pairs of short, rather wide intestinal cæca are crowded into XXI and XXII and are followed after a constriction by a somewhat bulbous dilatation.

*G. michælseni* is represented by a larger number of specimens than any other of the six species included in the collection.

No. 3. "In and near drying-up pools on high divide, 50 miles north of Rio Chico, near base of Cordilleras." 36 specimens.

No. 5. "Spring on Rio Chico, 15 miles above Sierra Oveja." 2 specimens.

No. 11. "Small running stream south side of Rio Chico, 15 miles above Sierra Oveja." 1 specimen.

No. 15. "Spring on Rio Chico, 25 miles below Sierra Ventana, Feb., 1899." 20 specimens.

No. 30. "Drying-up pool, banks of Arroyo Eke. Alt. 1,750 ft., Mar. 22, 1898." 34 specimens.

No. 35. "Spring near base of Andes, 65 miles north of Rio Chico. Altitude 2,400 ft., Feb., 1899." 20 specimens.

No. 38. "Spring on Rio Chico, 25 miles above Sierra Ventana, Mar., 1898." 1 specimen.

No. 43. "Drying-up pools near Arroyo Eke, altitude 2,100 ft., Feb., 1899." 30 specimens.

No. 48. "Rio Blanco." 3 specimens.

"In spring on Rio Chico." 1 specimen.

### HEMICLEPSIS TESSELLATA (Müller) Veydovsky.

A single individual, which is in nowise distinguishable from this well-known European species, was collected on the Rio Chico.

In demonstrating the identity of *Theromyzon pallens* Philippi with this species Blanchard has already shown that its range extends in South America as far south as Chili. Inasmuch as it is widely distributed, though by no means common, in North America, it may now be expected to occur generally over the American continent. *Hemiclepsis tessellata* is an excellent example of the wide distribution which some species of leeches have attained. An equally notable case is the *Glossiphonia stagnalis* (Linn.). Blanchard has recorded this species from Paraguay[1] and Chili.[2] I have specimens collected by Mr. Trevor Kincaid in Alaska and it abounds in all parts of the United States, Canada and Europe.

No. 32. "Small running stream on Rio Chico, 35 miles above Sierra Oveja, Mar., 1898." 1 specimen.

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[1] Bolletino dei Musei di Zoologia ed Anatomica comparata della R. Università di Torino, XI, 1896, p. 4.

[2] Hamburger Magalhaenische Sammelreise. Hirudineen, 1900, p. 8.

# ERRATA.

N. B. — Errors in the technical names of Fishes in Part III, pp. 225–374, are entered in the index as synonyms.

Page 2, line 22, *for* Port Desire, *read* Santa Cruz.
Page 2, line 25, *for* Rio Belgrado, *read* Rio Belgrano.
Page 2, line 27, *for* Rio Belgrado, *read* Rio Belgrano.
Page 3, line 8, *for* Rio Belgrado, *read* Rio Belgrano.
Page 4, line 36, for *Hydrurgus*, read *Hydrurga*.
Page 10, line 31, for *Creagoceros*, read *Creagroceros*.
Page 32, line 30, *for* Viscache, *read* Viscacha.
Page 38, line 7, *for* CTENOMYS ROBUSTUS Allen, *read* CTENOMYS OSGOODI Allen. (*See* Postscript, p. 191.)
Page 63, line 2, *for* Maldonaldo, *read* Maldonado.
Page 85, line 14, *for* Matchie, *read* Matschie.
Page 85, line 16, for *O. micropus*, read *O. microtis*.
Page 85, line 28, for *Mirounga leoninus*, read *M. leonina*.
Page 90, line 34, *for* Juan Fernandes, *read* Juan Fernandez.
Page 94, line 14, for *Rhinophora*, read *Rhinophoca*.
Page 97, line 19, *for* Mas-a-Fuero, *read* Mas-a-Fuera.
Page 100, line 9, *for* Aukland, *read* Auckland.
Page 105, line 1, *for* Aukland, *read* Auckland.
Page 114, line 7, *for* Freizer, *read* Frazier.
Page 120, line 24, for *Gysophoca*, read *Gypsophoca*.
Page 131, line 26, for *Orctocephalus*, read *Arctocephalus*.
Page 133, line 2, *for* Mas-a-Fuero, *read* Mas-a-Fuera.
Page 143, line 10, for *Galictis vittata*, read *Grison vittatus*.
Page 144, line 6, for *Thiosomus*, read *Thiosmus*.
Page 159, line 16, *for* incensce, *read* incense.
Page 184, line 6, *for* Gallagos, *read* Gallegos.
Page 319, line 20, *for* Guaina, *read* Guainia.
Page 373, line 8, for RIO REBEIRO, read RIO RIBEIRA.
Page 373, line 10, *for* Rebeiro, *read* Ribeira.
Page 373, lines 10, 21, 23, 24, 32, *for* Rebeira, *read* Ribeiro.
Page 373, line 28, for †, read *.
Page 373, lines 35, 36, for *Trichomycterus*, read *Pygidium*.
Page 374, line 1, for *Trichomycterus*, read *Pygidium*.
Page 374, lines 1, 7, 8, 10, 14, 17, 21, 22, *for* Rebeira, *read* Ribeiro.
Page 374, line 26, *for* Rebeira, *read* Ribeira.
Page 374, line 28, for *autocthon*, read *autochthon*.
Page 384, col. 1, line 34, for BREVIGLANIS, read BRACHYGLANIS.
Page 384, col. 1, lines 35, 37, 39, 41, for *Breviglanis*, read *Brachyglanis*.
Page 384, col. 2, line 17, for CHASMOCEPHALUS, read CHASMOCRANUS.

Page 384, col. 2, lines 18, 21, 23, for *Chasmocephalus* read *Chasmocranus.*
Page 399, col. 1, line 39, for *corduvense,* read *cordovense.*
Page 400, col. 2, line 9, for *guianensis,* read *guianense.*
Page 404, col. 1, line 8, for *commersonii,* read *commersoni.*
Page 405, col. 2, line 11, for Hypoptopominæ, read Hypoptopomatinæ.
Page 408, col. 1, line 1, for *N. duseni,* read *H. duseni* Ribeiro.
Page 413, col. 1, line 37, for *Loricaria dura* Linnæus, read *Loricaria dura* Bleeker.
Page 416, col. 2, line 14, for *Farlowella aca,* read *F. acus.*
Page 417, col. 1, line 22, for *Cyclopium longifile,* read *C. longifilis.*
Page 421, col. 1, line 23, for *Curimatus spiluropis,* read *C. spiluropsis.*
Page 424, col. 1, line 34, for *Prochilodus hartii,* read *P. harttii.*
Page 434, col. 2, line 42, for *Piabina argenteus,* read *P. argentea.*
Page 443, col. 1, line 4, for *Myletus,* read *Myletes.*
Page 457, col. 2, line 21, for *Labias,* read *Lebias.*
Page 465, col. 1, line 28, *Chirostoma ocotlane,* read *C. ocotlanæ.*
Page 467, col. 1, line 15, for *Pristopoma,* read *Pristipoma.*
Page 468, col. 1, line 4, for *Johnius crouvina,* read *J. corvinus.*
Page 468, col. 2, line 10, for *Pachyurus schomburgki,* read *P. schomburgkii.*
Page 479, col. 2, line 31, for *Platox,* read *Platax.*
Page 484, col. 1, line 22, *for* Myleobatidæ, *read* Myliobatidæ.
Page 484, col. 2, line 22, *for* Pæciliidæ, *read* Pœcilliidæ.
Page 573, lines 22, 36, for *P. filipponei,* read *P. felipponei.*
Page 573, lines 38, 40, for Potamolithus filipponei, read P. felipponei.
Page 574, line 13, *for* Filippone, *read* Felippone.
Page 579, under Potamolithus chloris, *for* Figs. 8, 8*a*, *read* Figs. 7, 7*a*.
Page 581, under Potamolithus buschii, *for* Fig. 3, *read* Fig. 2.
Page 584, under Potamolithus intracallosus, *for* Figs. 9, 9*a*, *read* Figs. 8, 8*a*.
Page 584, under Potamolithus ribeirensis, *for* Figs. 6, 7, *read* Figs. 5, 6.
Page 588, line 1, *for* fig. 5, *read* fig. 4.
Page 589, under Potamolithus paranensis, *for* Figs. 10, 11, *read* Figs. 9, 10.
Page 601, under Potamolithus philippianus, *for* Figs. 1, 1*a*, 2, *read* Figs. 1, 1*a*, 1*b*.

# INDEX TO VOLUME III.

Page numbers italicized indicate the most important entry under the heading. The numbers with asterisks refer to text illustrations. Synonyms are in italics. The synonymy of the fishes is in accordance with the catalogue, pp. 376–484. All names of rivers in Latin America are entered under "Rio."

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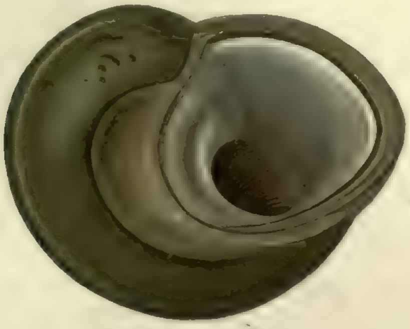
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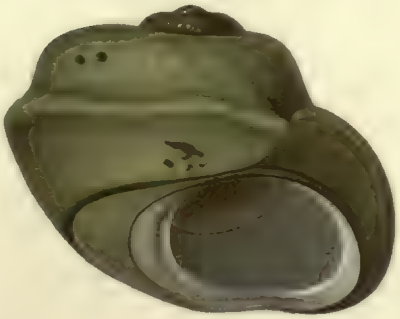
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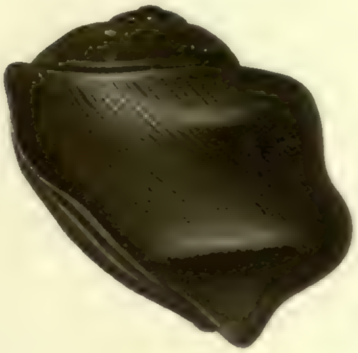
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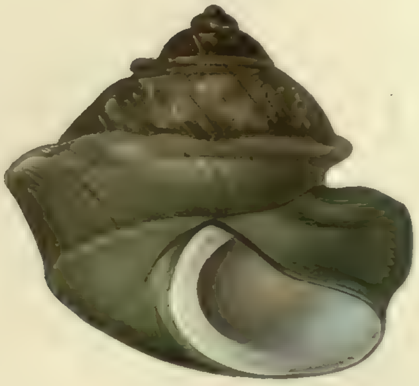
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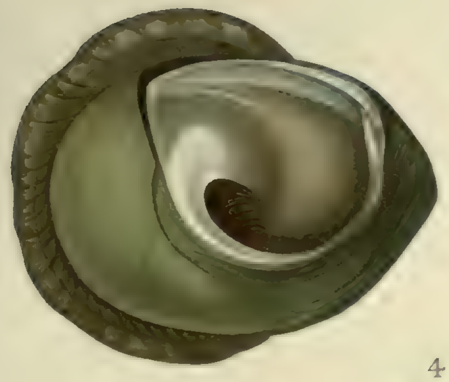
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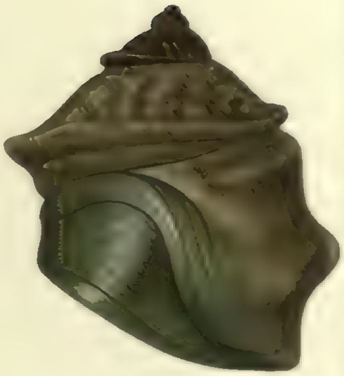
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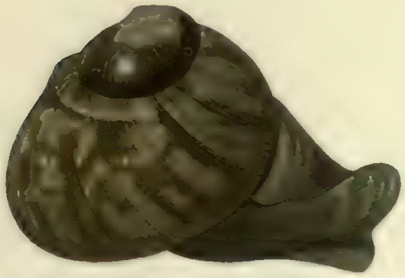
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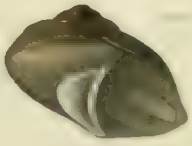
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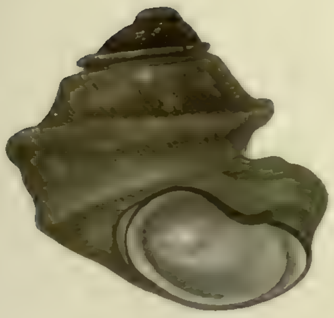
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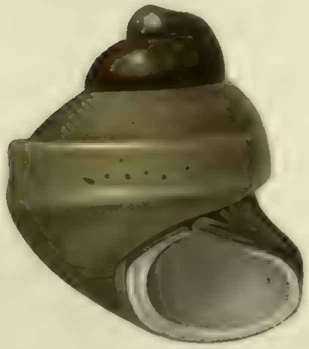
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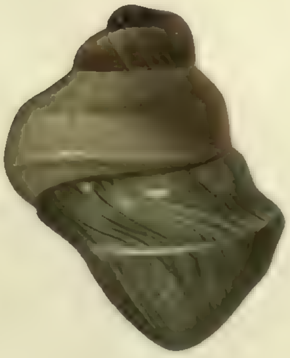
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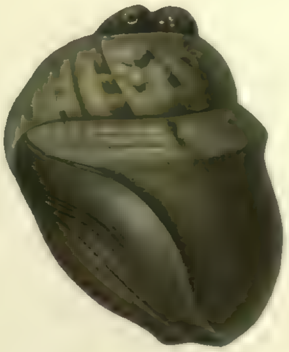
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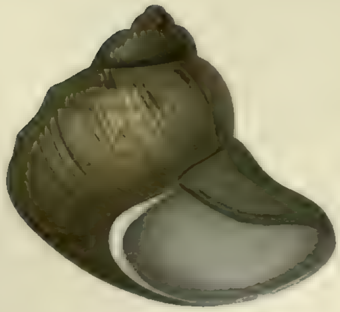
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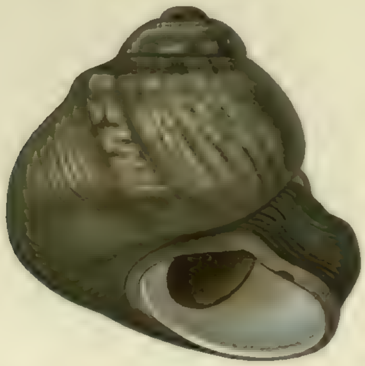
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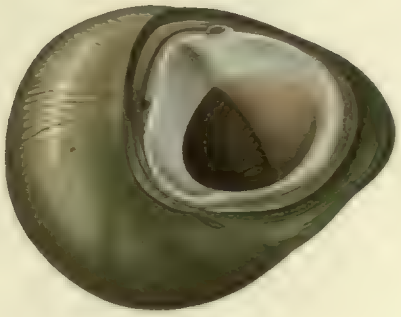
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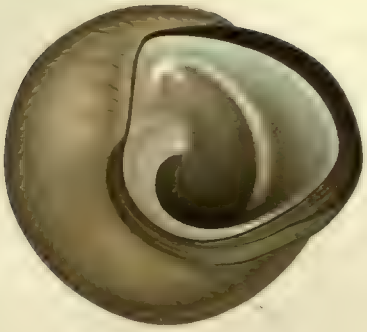

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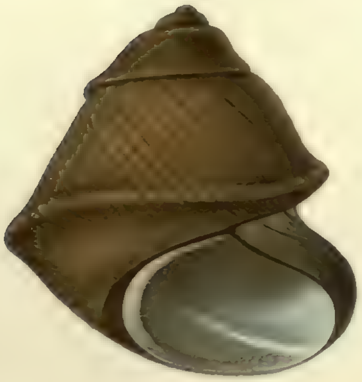

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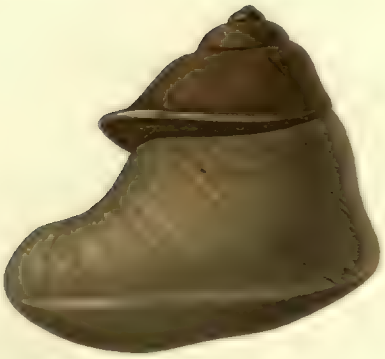

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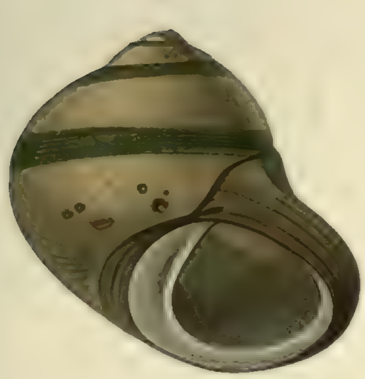

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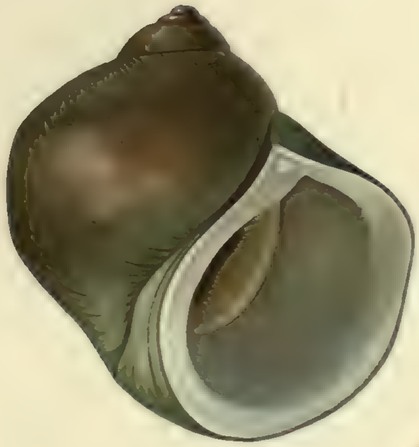

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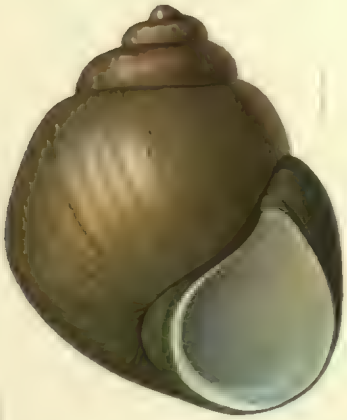

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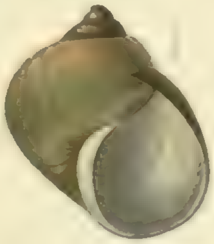

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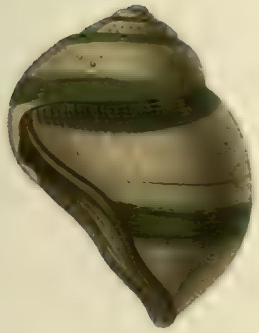

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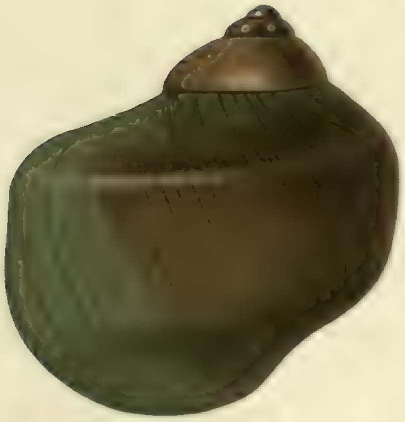

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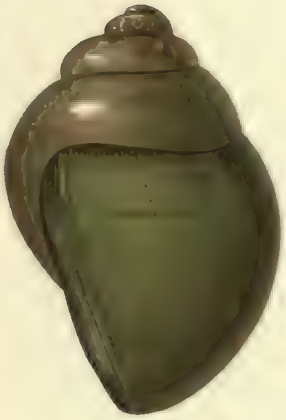

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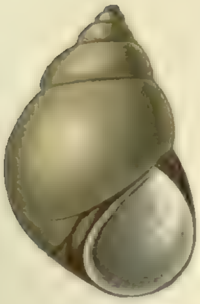

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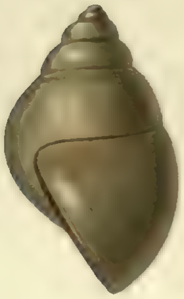

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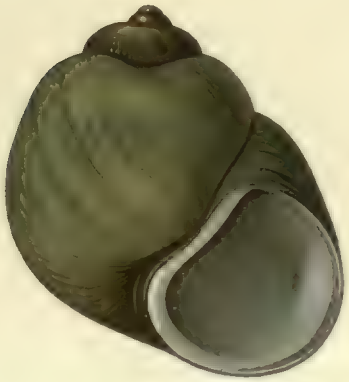

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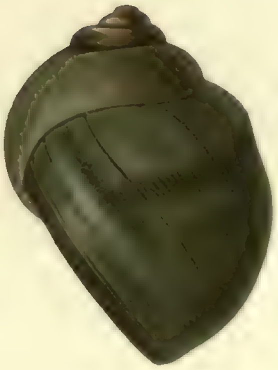

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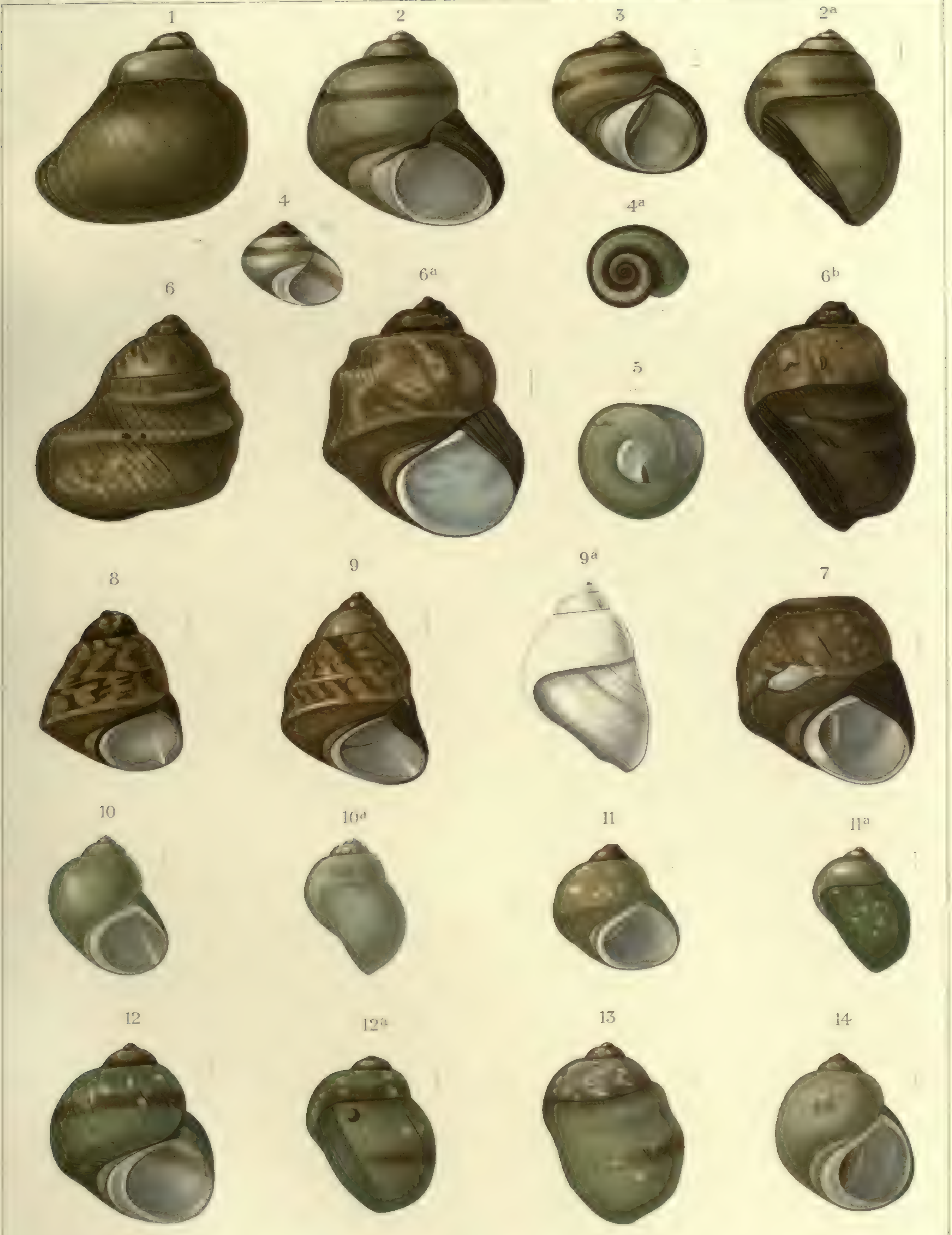
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4a
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6a
6b
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7
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10a
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12a
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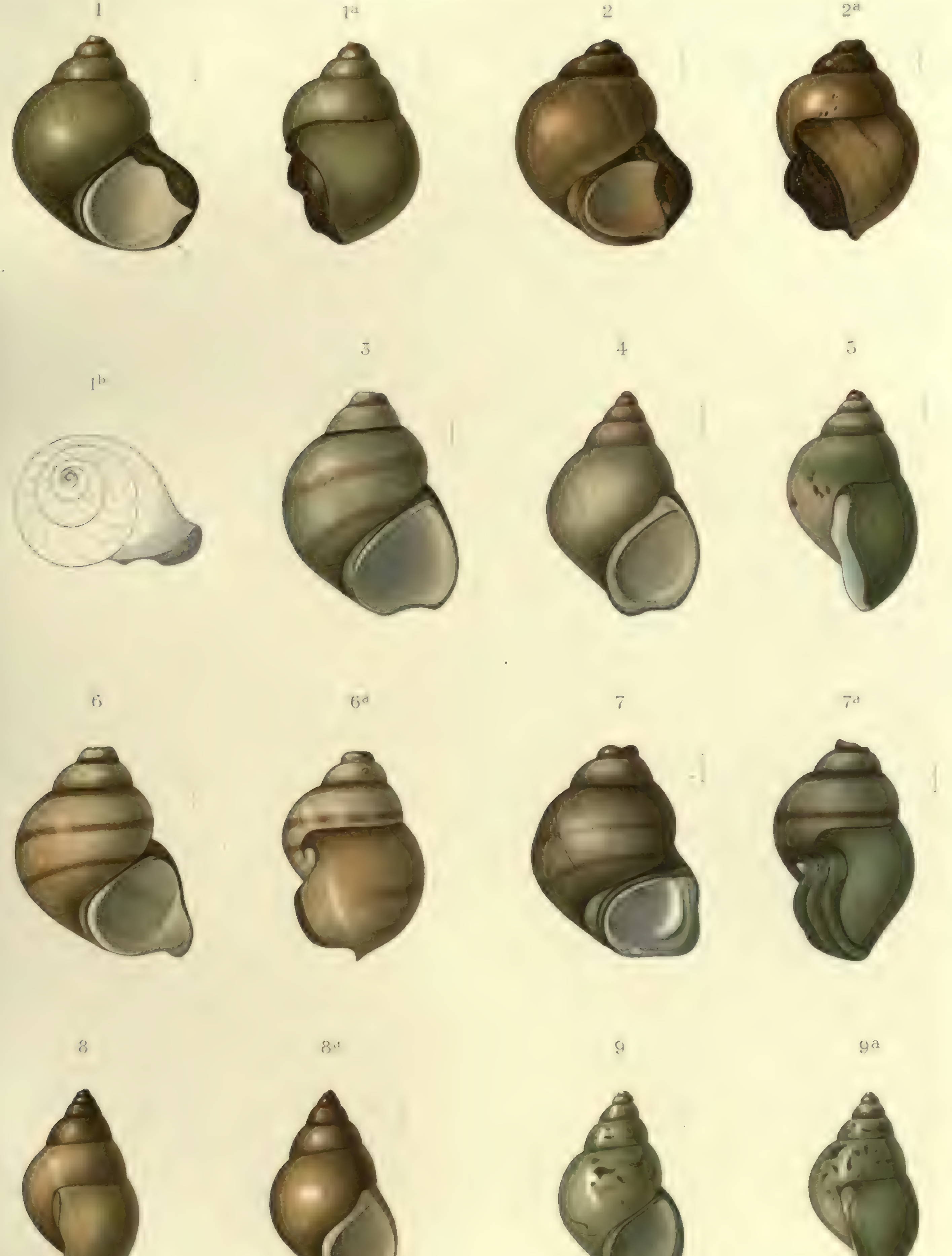
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9a

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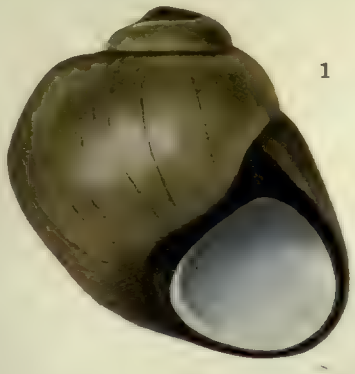
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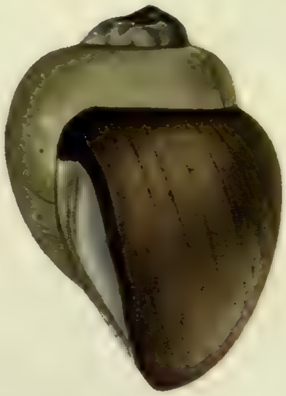
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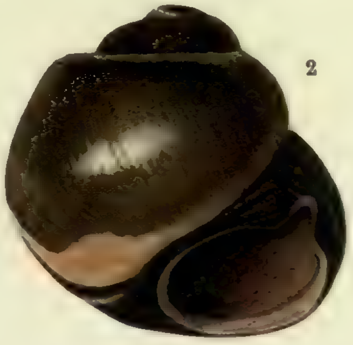
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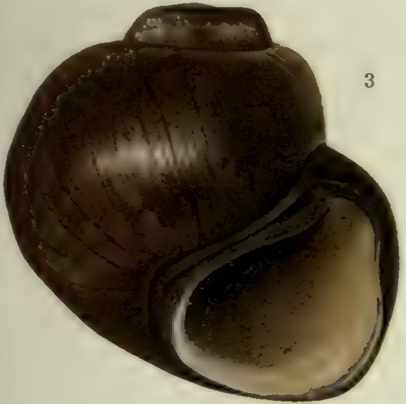
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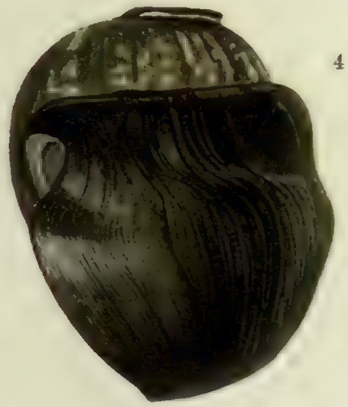
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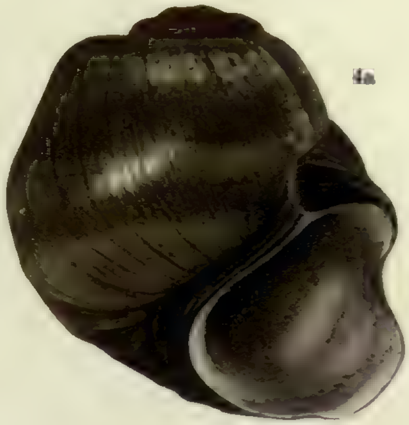
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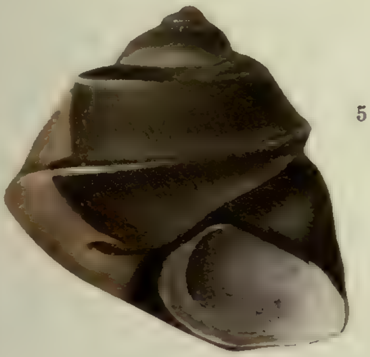
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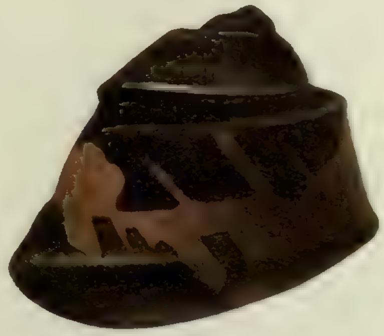
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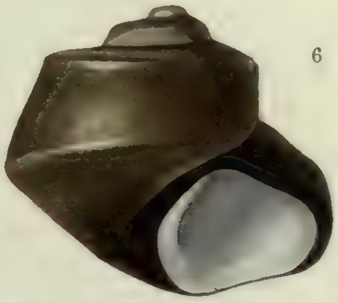
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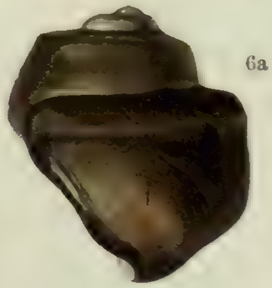
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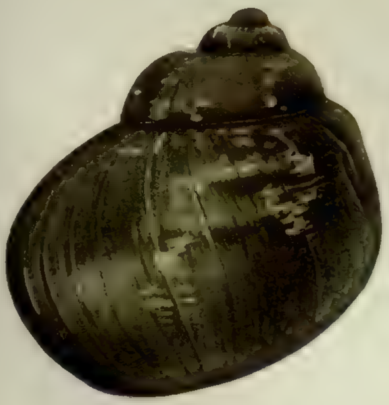
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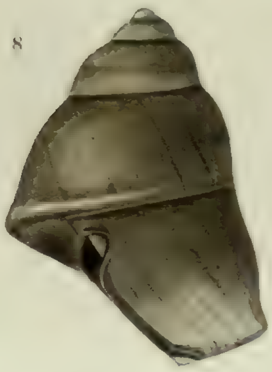
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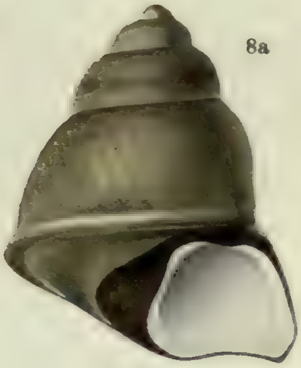
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POTAMOLITHUS.

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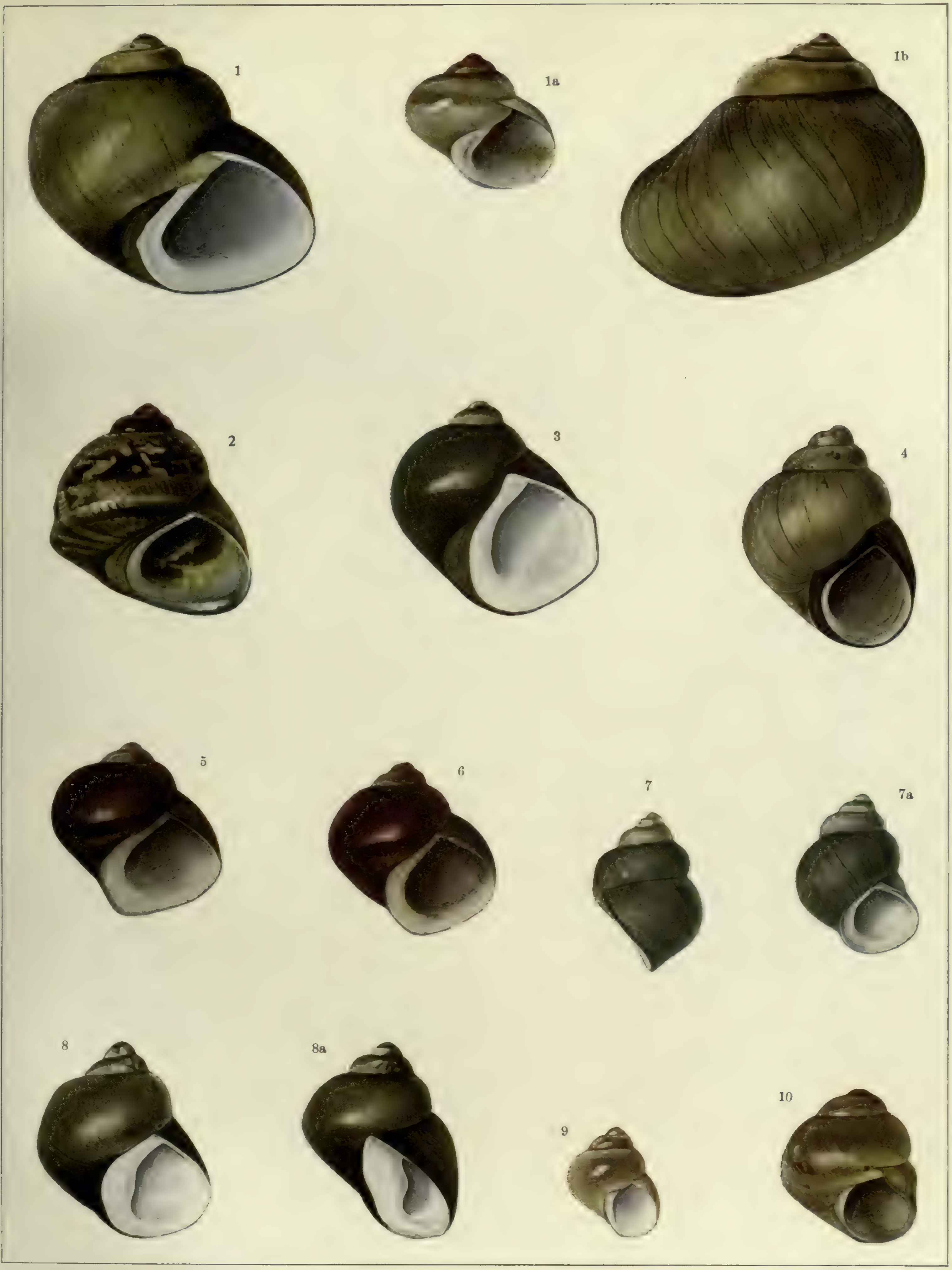
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POTAMOLITHUS.

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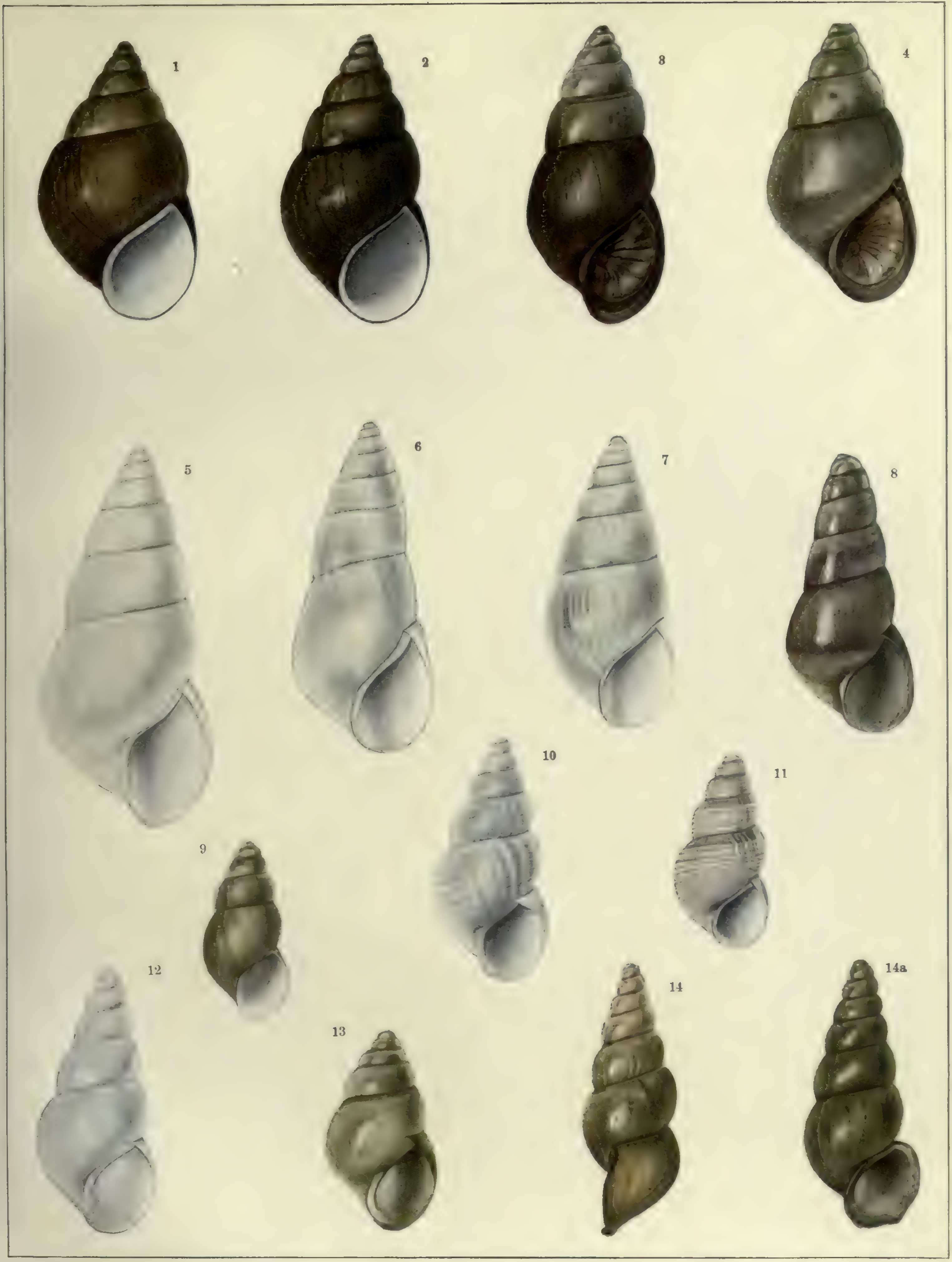
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LITTORIDINA POTAMOPYRGUS IDIOPYRGUS

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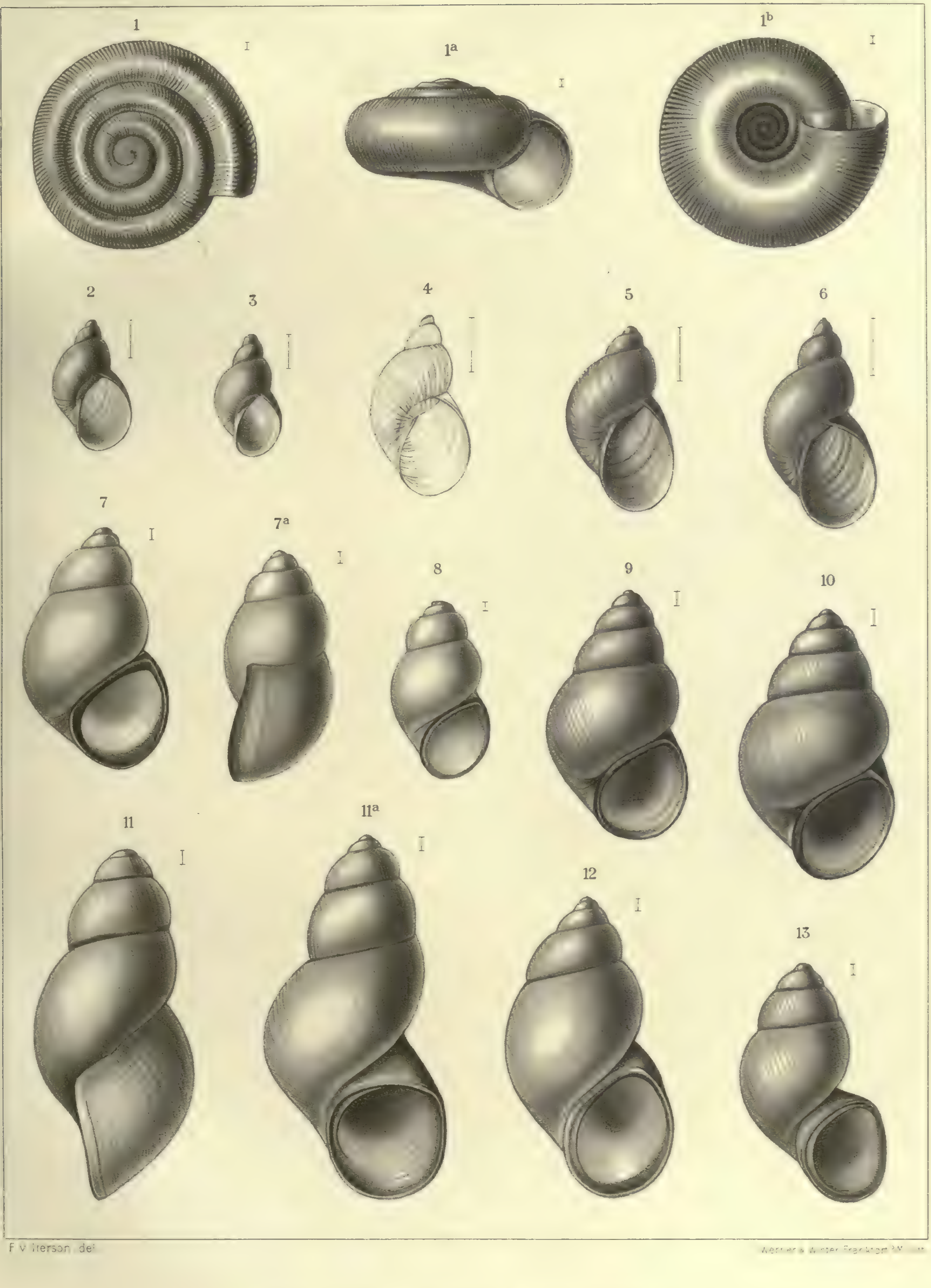
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RADIODISCUS, SUCCINEA & PALUDESTRINA

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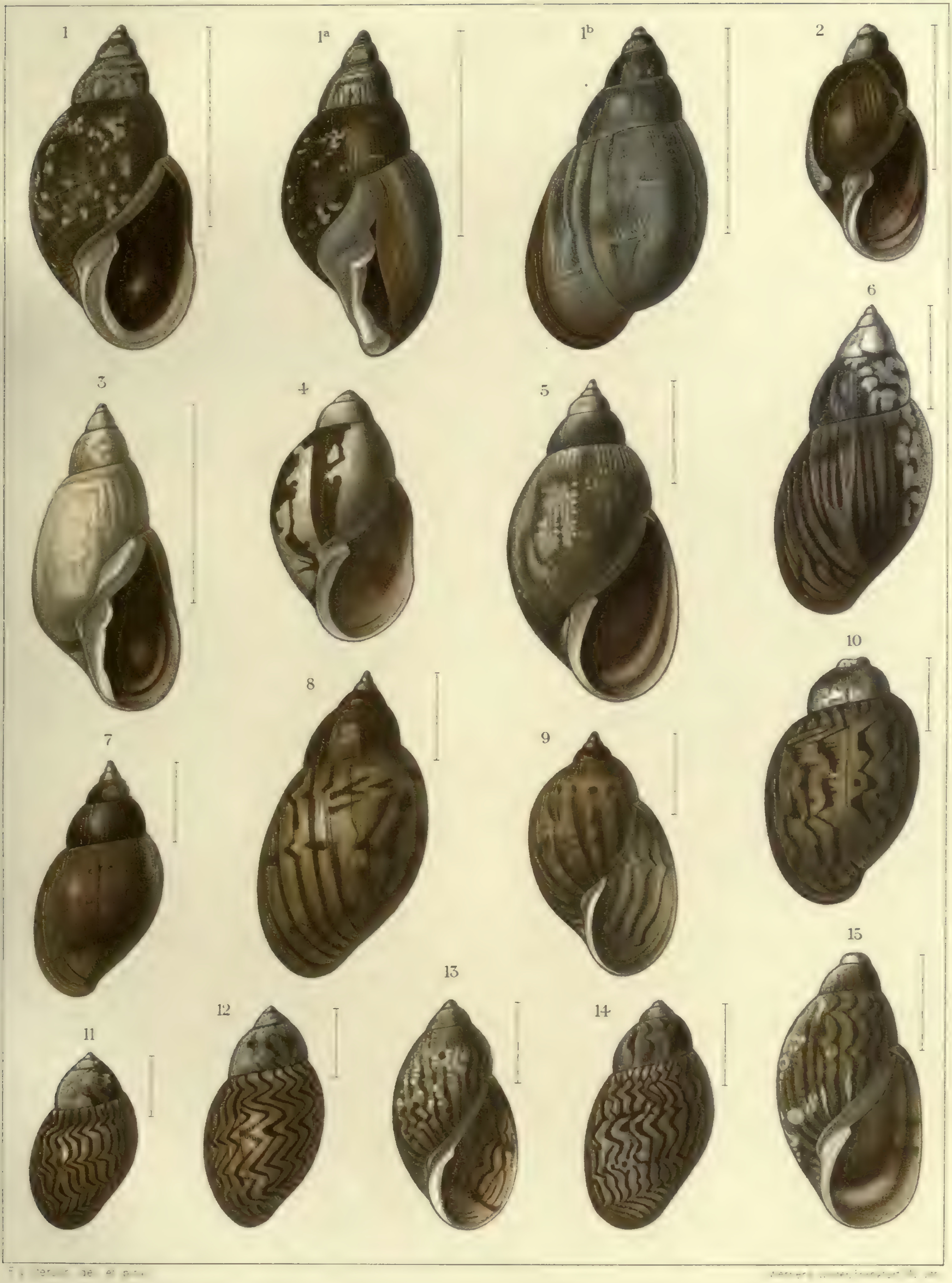
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CHILINA

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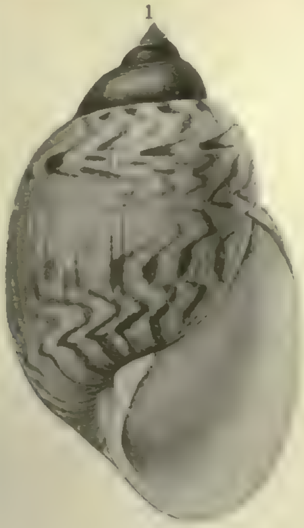

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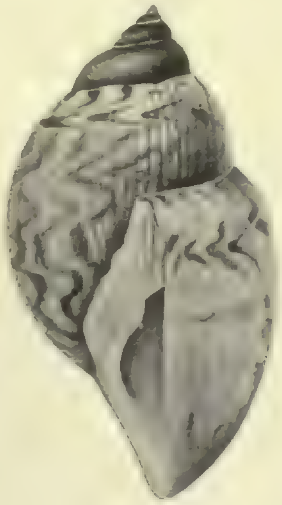

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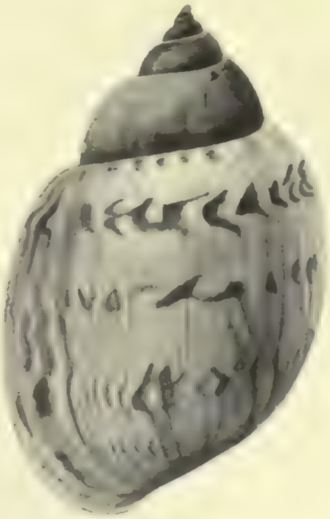

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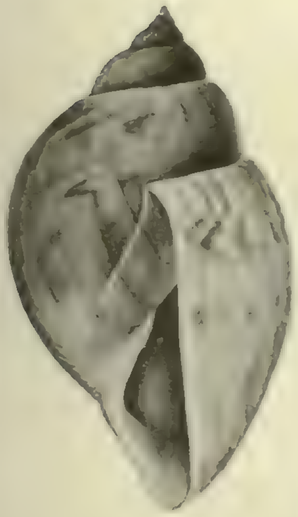

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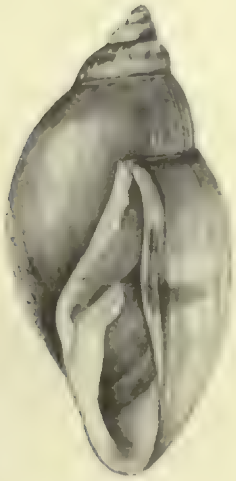

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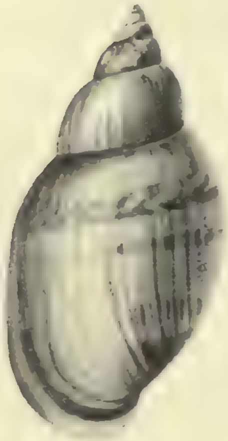

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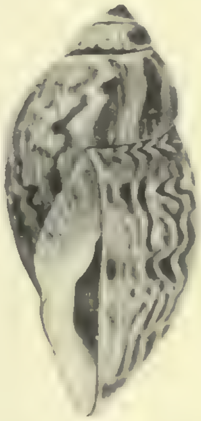

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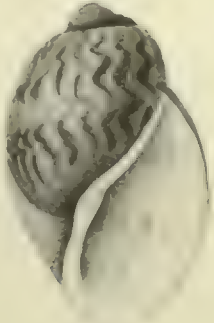

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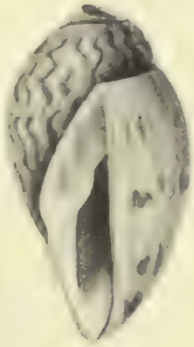

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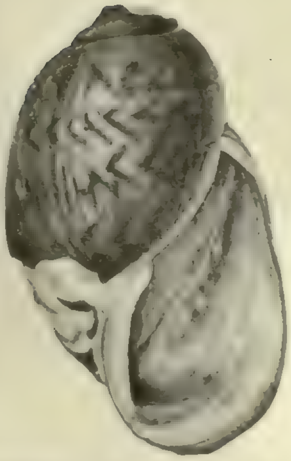

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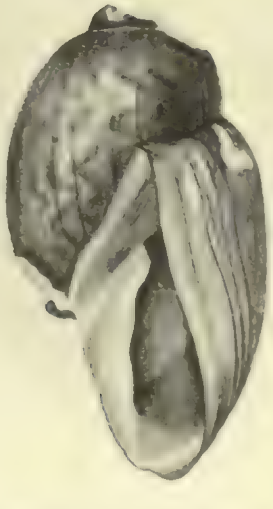

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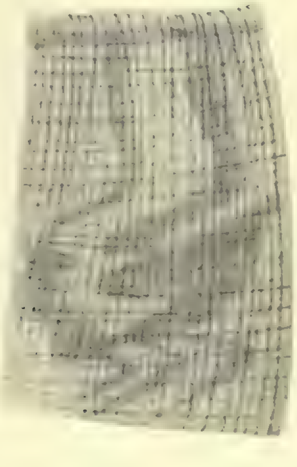

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CHILINA.

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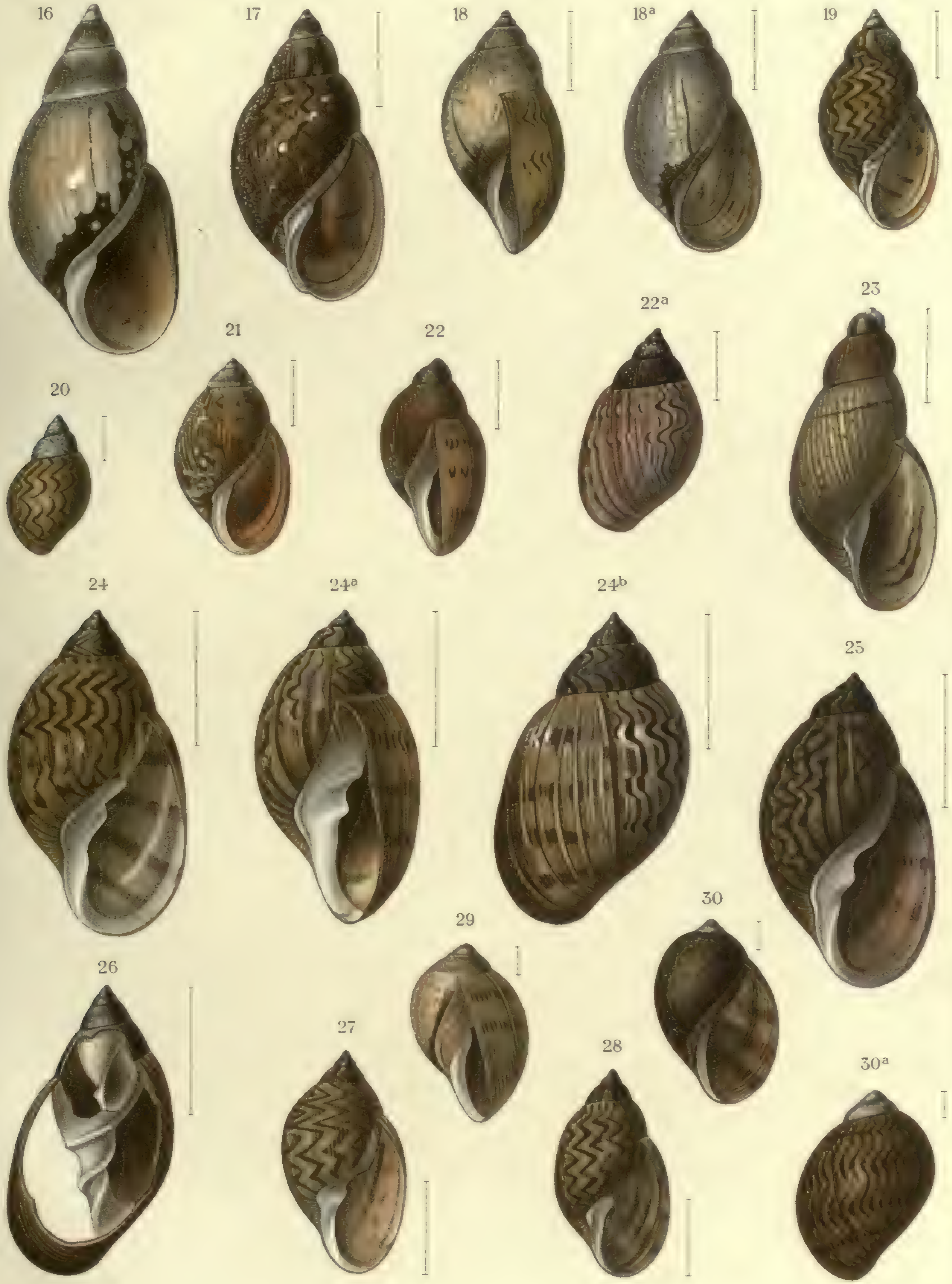
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Werner & Winter Frankfort a/M. lith.

CHILINA

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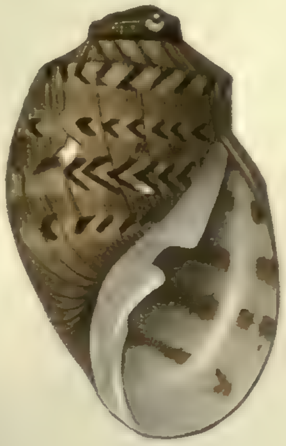

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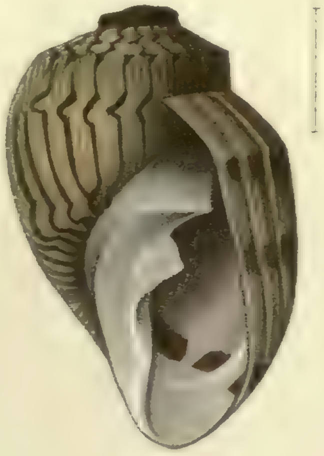

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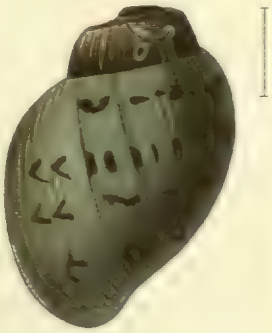

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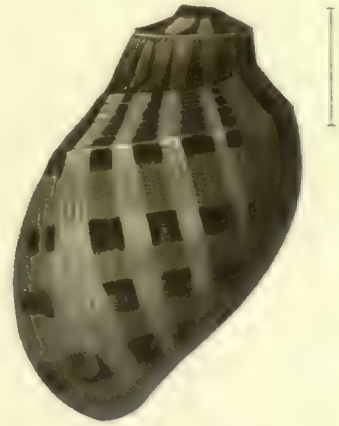

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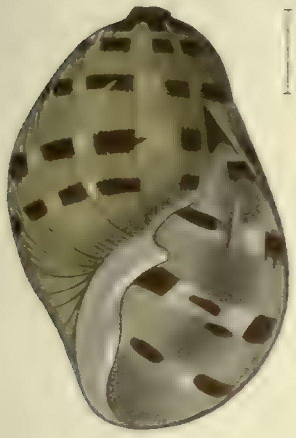

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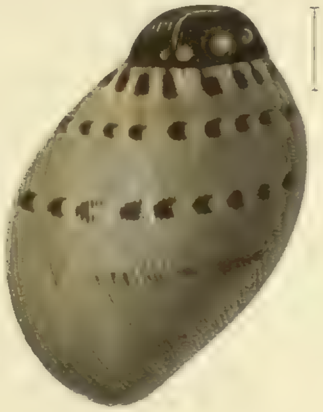

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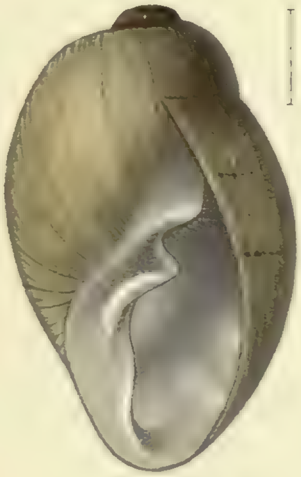

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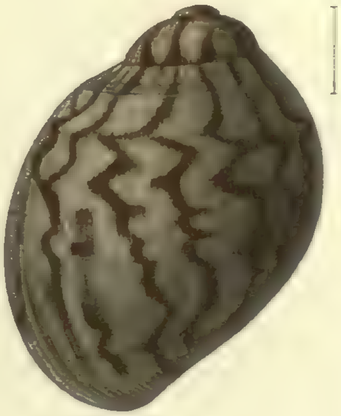

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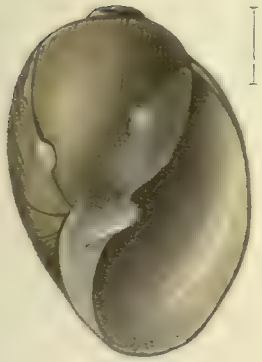

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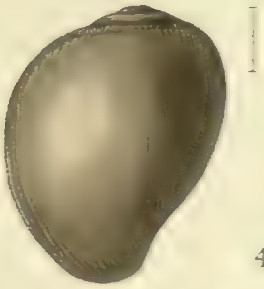

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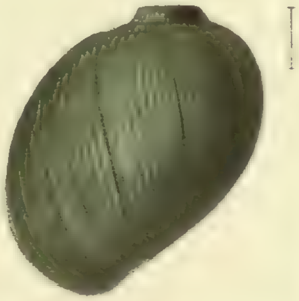

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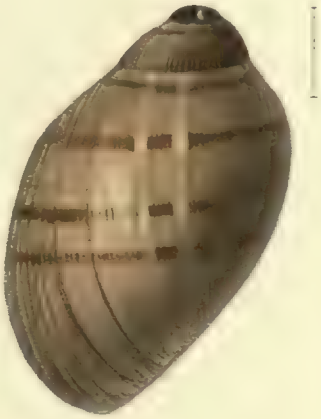

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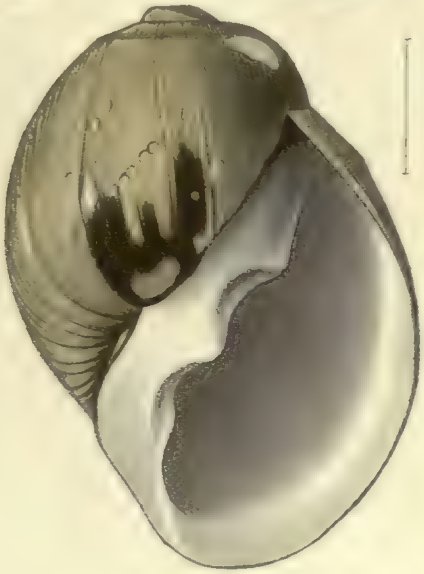

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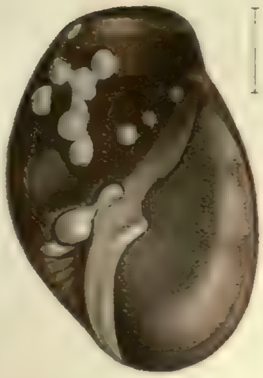

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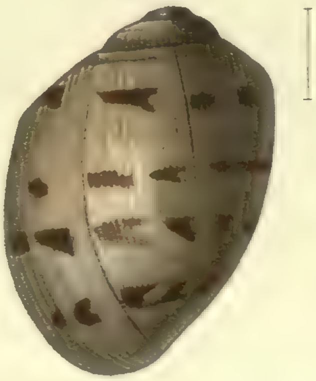

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Werner & Winter, Frankfurt a/M. lith.

CHILINA

# EXPLANATION OF PLATE XLVI.

| | | PAGE |
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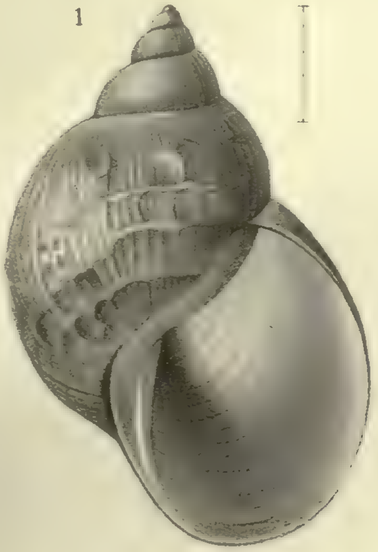

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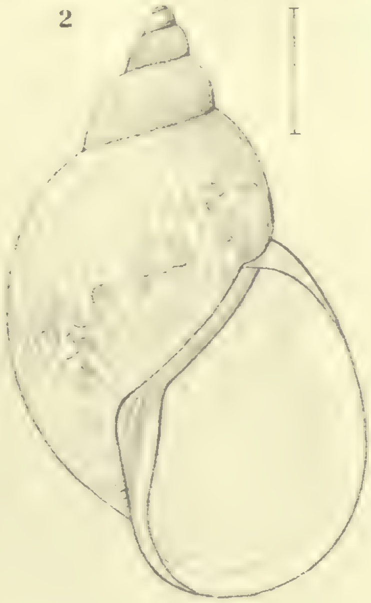

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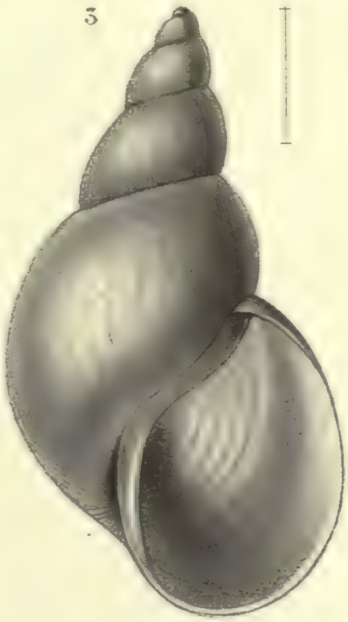

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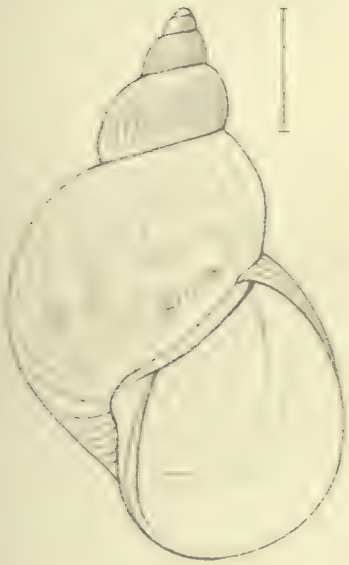

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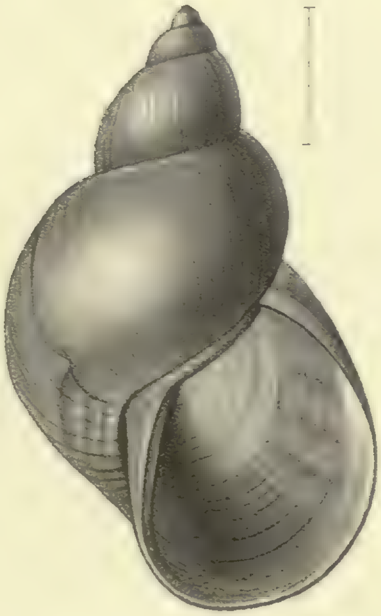

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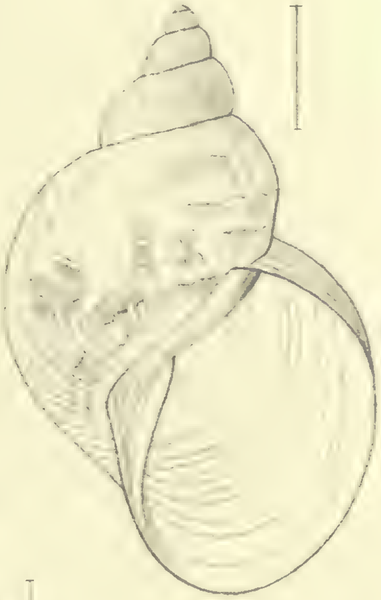

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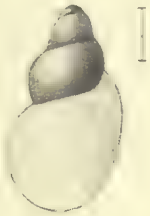

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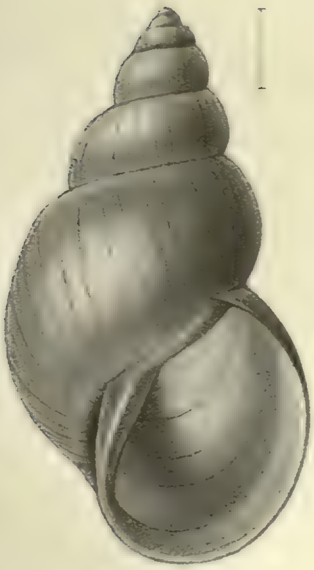

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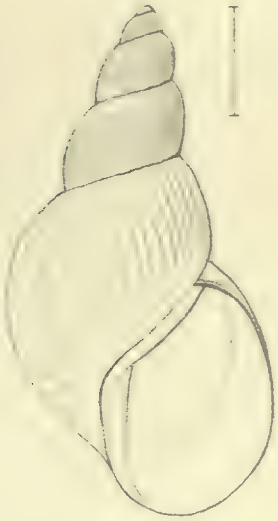

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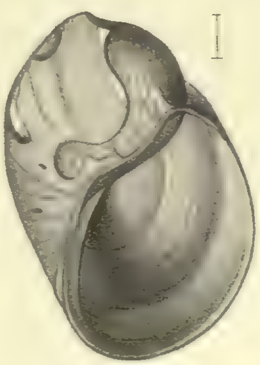

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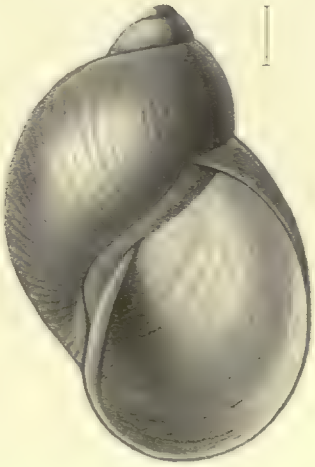

F. v. Iterson del.                Werner & Winter Frankfort a/M. lith.

LYMNÆA

## EXPLANATION OF PLATE XLVI.A.

| | | PAGE |
|---|---|---|
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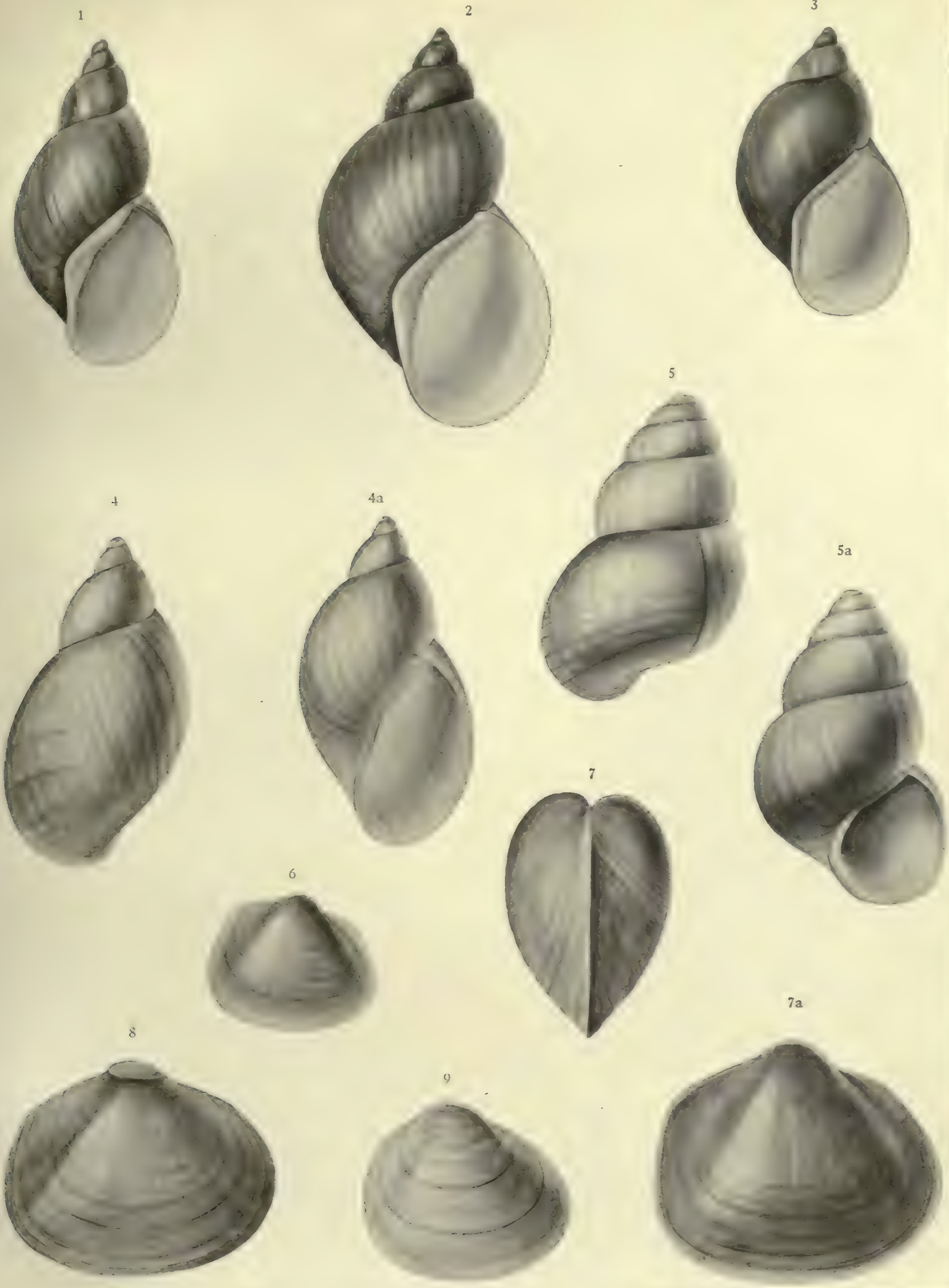
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Helen Winchester del et pinxt

Cockayne, Boston

LYMNÆA, LITTORIDINA, MUSCULIUM, PISIDIUM.

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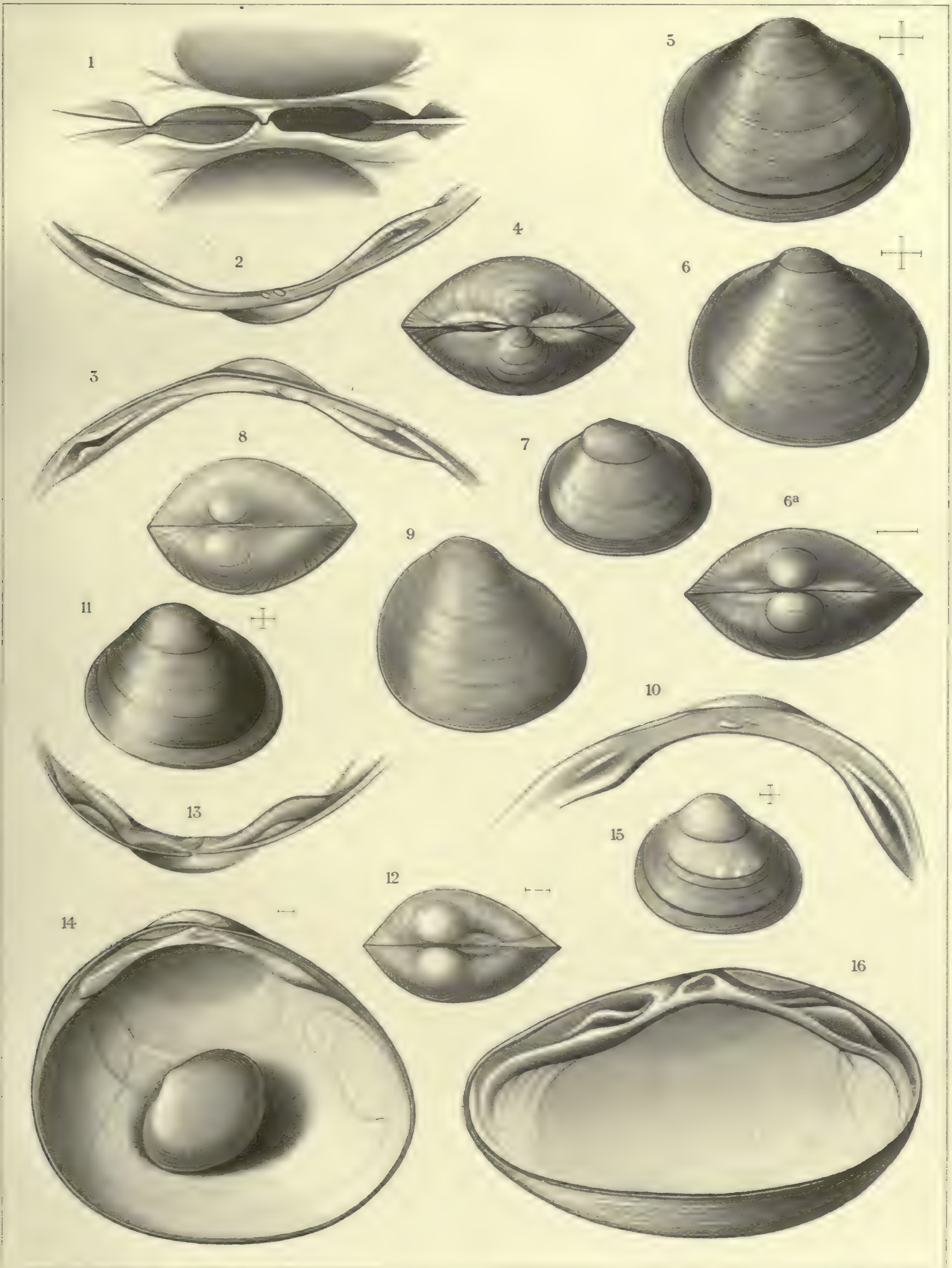
PLATE XLVII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F. v. Iterson del.

Werner & Winter Frankfort a/M. lith.

MUSCULIUM & PISIDIUM

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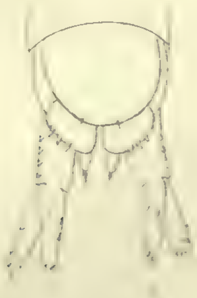

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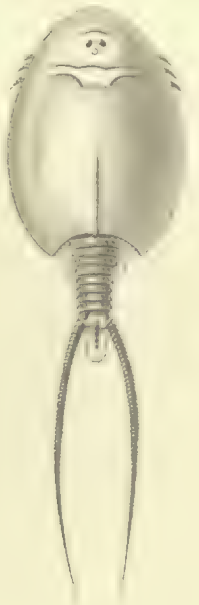

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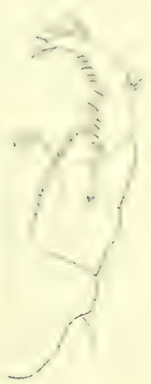

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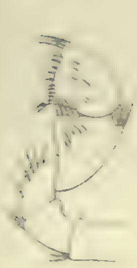

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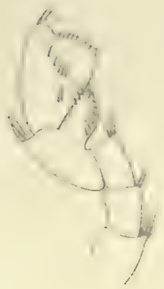

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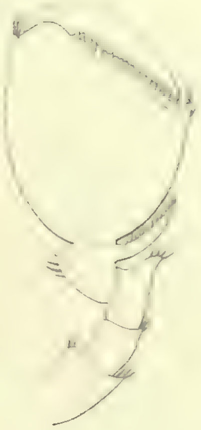

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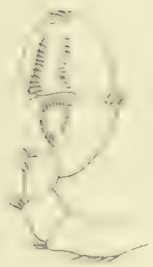

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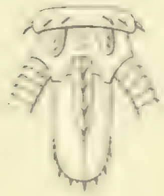
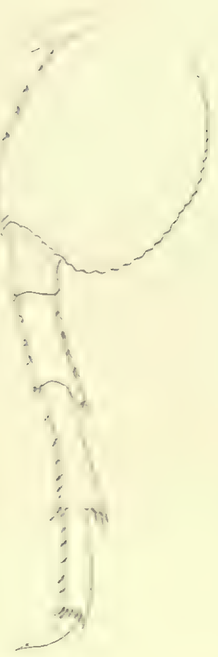


$3^{g}$



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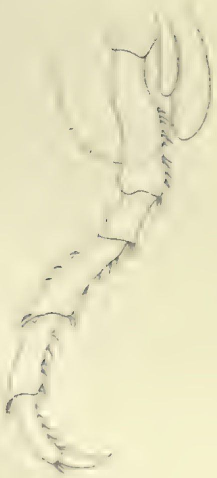

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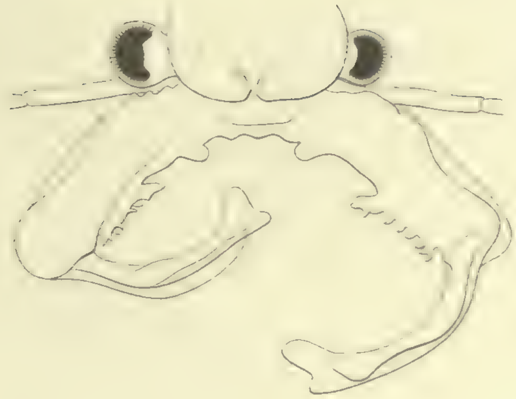

CRUSTACEA

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| | | | PAGE |
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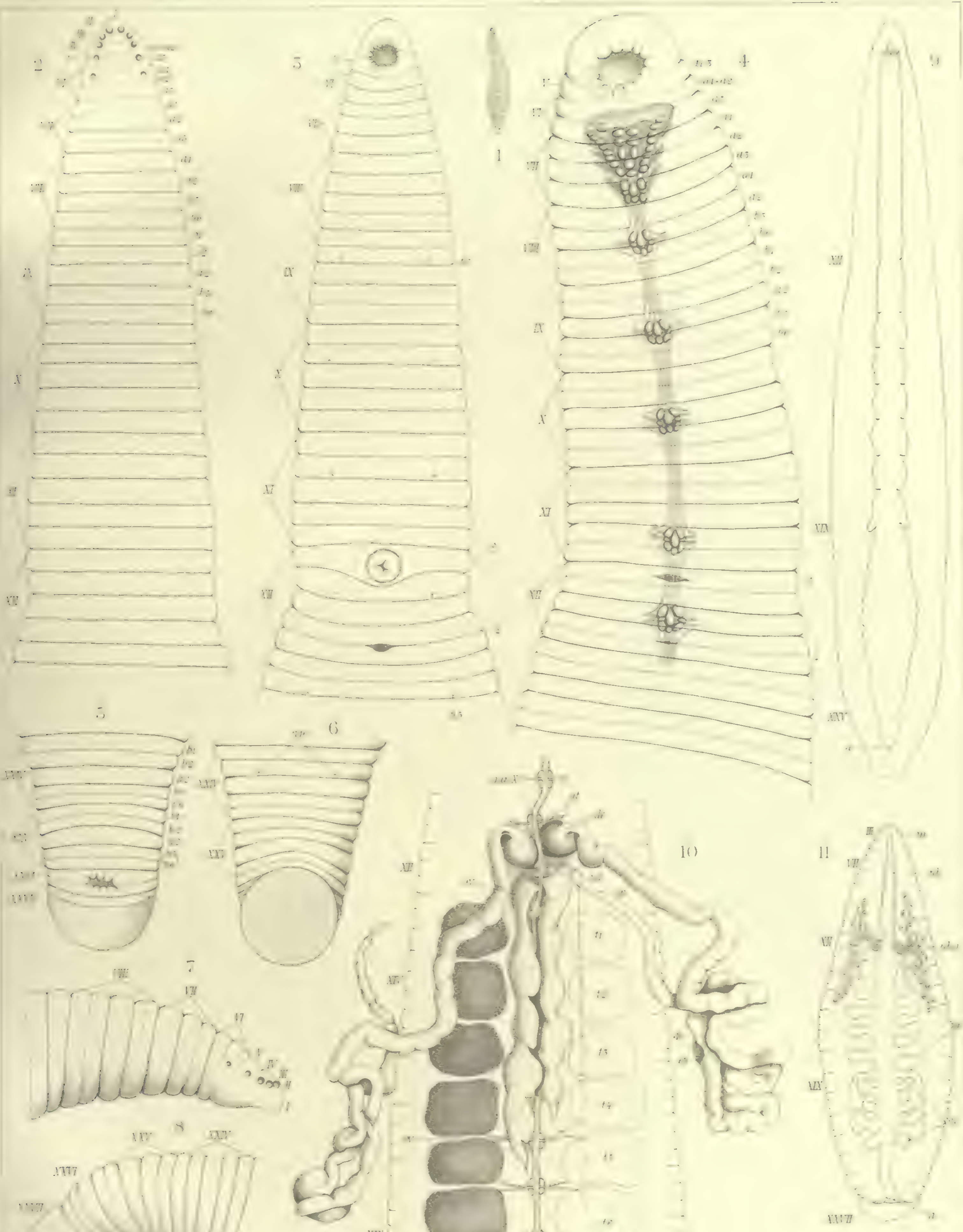
LETTERING: *a*, anus; *at*, atrium (penis sheath or prostate cornua); *de*, ductus ejaculatorius; *ep*, epididymis; *gan*, ganglion, the neuromere indicated by a Roman numeral; *gc*, gastric cæca; *ga*, glandula albuginea; *ic*, intestinal cæca; *m*, mouth; *n*, nephropore; *odc*, common oviduct; *ov*, ovary; *ph*, pharynx; *phg*, pharyngeal glands; *pg*, prostate glands; *t*, testes, the serial number of which is indicated by a numeral; *va*, vagina; *vd*, vas deferens. The somites are numbered with the usual Roman characters, the annuli with their symbols.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# EXPLANATION OF PLATE L.

| | | | PAGE |
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| Fig. 12. | SEMISCOLEX VARIABILIS: | Dorsal aspect of reproductive organs in situ, the vagina only being slightly displaced to the right. From a dissection of specimen shown in Fig. 1. The position of the vasa efferentia is somewhat doubtful, as they could not be distinguished with certainty from the folds of the vas deferens, $\times \frac{21}{2}$ | 673 |
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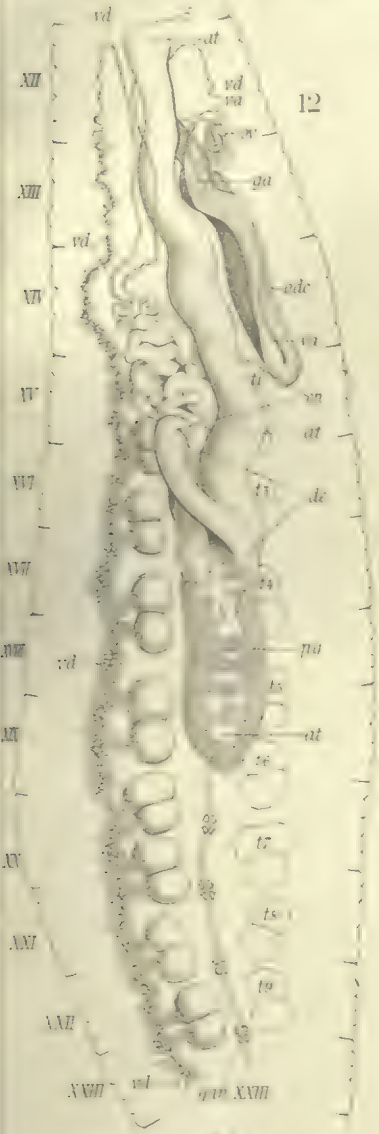
LETTERING: As in Plate XLIX.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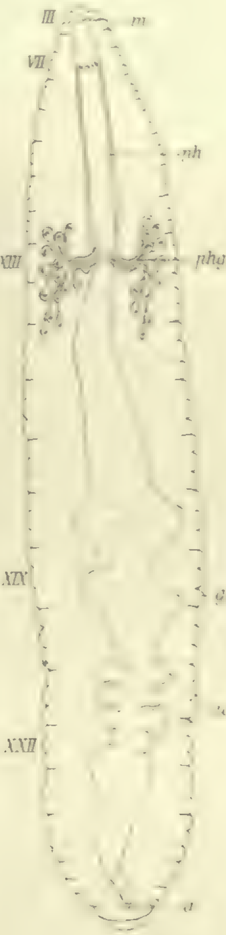
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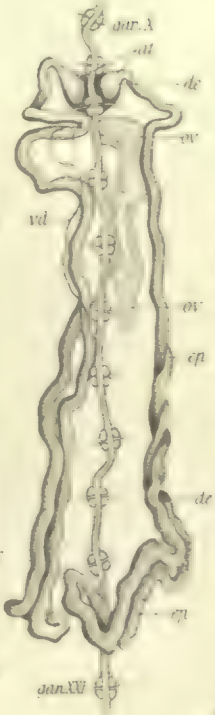
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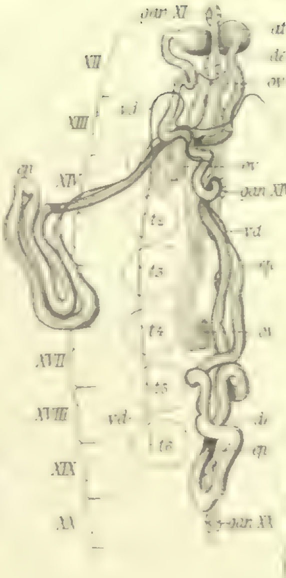
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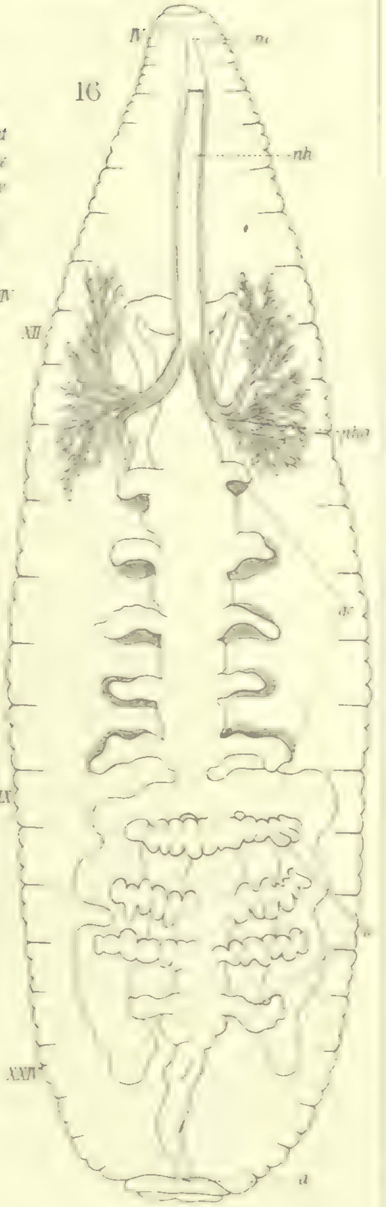
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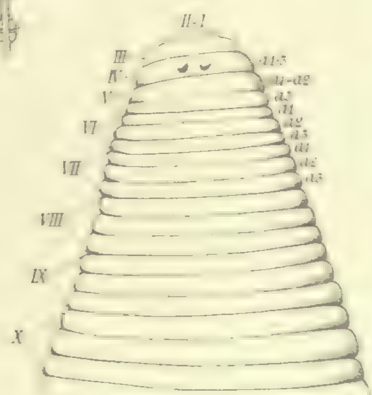
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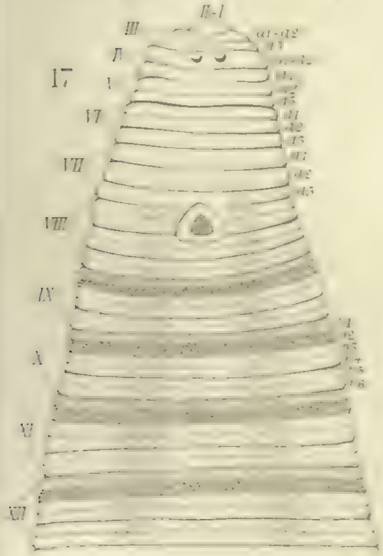
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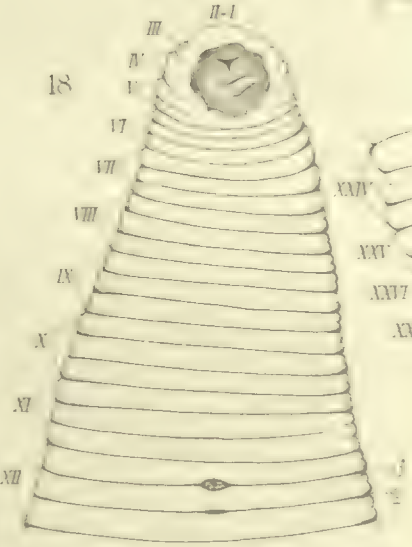
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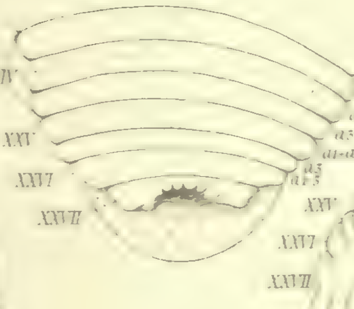
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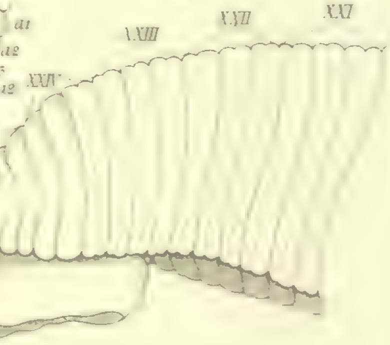
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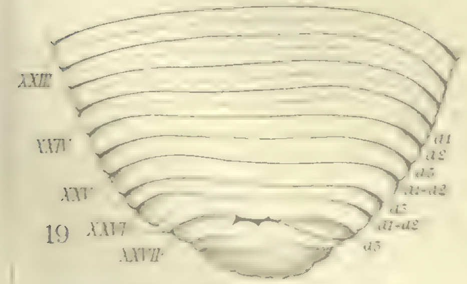
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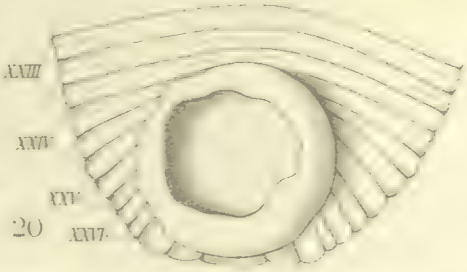
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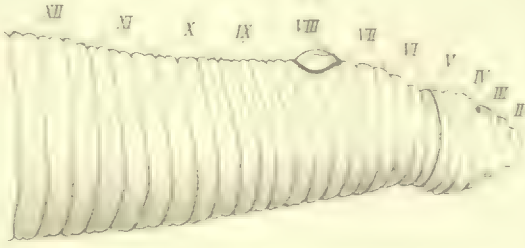
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